REQ.NO.2-9098

SIMON-CARVES

CONTRACT REPORT NO. OSQ82-00096

# FINAL REPORT
# for
# 10 TONNE/HR COAL PILOT PLANT
# at
# DEVON, ALBERTA

MARCH 1983

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## FOREWORD

In August 1982, Simon-Carves were awarded the contract to redesign the CANMET Coal Research Laboratory 10 tonne/hr Coal Preparation Pilot Plant in readiness for the proposed move to the Devon Coal Research Centre.

The existing Pilot Plant at the Clover Bar location has been gradually constructed over a period of several years and is, as a result, not composed of totally compatible units. Part of Simon-Carves' scope has been to modify the circuits in order to alleviate operational difficulties encountered when the current plant is run. Also, because the current plant has gradually evolved, equipment placement is not ideal and the relocation to a new custom built facility, therefore, permits re-arrangement into a more desirable configuration.

The new Devon facilities provides for two areas for the current pilot-scale equipment to be located:

- a raw coal crushing and handling area located in the general services section of the building; and

- an adjacent dedicated coal preparation pilot plant area.

This latter area comprises 192 $m^2$ area on three floor levels with all services, i.e., water, electrical power, lighting, compressed air and space heating supplied.

On commencement of Simon-Carves' contract, this building had been under construction for several months and the basic structure and cladding was more or less complete.

The Simon-Carves' contract, awarded on August 26, 1982 called for a completion date of December 31, 1982 but due to difficulties arising out of the need to modify the flooring in the new building, this completion date was subsequently extended to March 15, 1983.

## ACKNOWLEDGEMENT

Simon-Carves would like to acknowledge the consistently effective cooperation and assistance so courteously afforded to them at all stages of this project by the Coal Research Laboratory staff. In particular, Mr. O.E. Humeniuk, who in his role as Scientific Authority, was both industrious and extremely helpful to all members of the Simon-Carves project team.

We are also grateful for the cooperation and assistance of Supply and Services Canada in Quebec and the Alberta Government Services Department at various stages of our work.

SECTION 1

## 1.0 INTRODUCTION

All coal research facilities currently located in the Edmonton area are to be accommodated by one large complex at Devon. Included in these facilities will be the Coal Research Laboratories (C.R.L.) of the Department of Energy, Mines and Resources which are currently temporarily housed at the Clover Bar laboratories of the Alberta Research Council.

In May 1982, Simon-Carves of Canada Ltd. were invited to submit a proposal to the C.R.L. for the design of a 10 tonne/hr coal preparation pilot plant for the new Devon location. We are pleased to have been awarded the contract in August 1982, to perform this design work and this report contains the ensuing results of an intensive eight month programme of work.

The contract called for the following scope of work:

1) Design of new handling and crushing systems for raw coal, 150 mm top size, to be crushed to 10 mm top size and to supply specifications of equipment to handle 15 - 20 tonne/hr.

2) Layout of pilot plant equipment to be located on three levels within available space of about 190 m$^2$ (not including handling and crushing space). The layout will include mechanical, electrical and piping required for plant construction.

3) Incorporation of flexibility in design and equipment location as the main criteria in order to ensure future changes may be readily made;

4) Consultation with the Scientific Authority regarding location of equipment and possible changes.

## 1.0 INTRODUCTION (Cont'd.)

The current pilot plant facilities at Clover Bar have been assembled over several years, largely as a result of specific research directives. Because of this, the current components are neither compatible to collective operation, nor conducive to research and development work as a total pilot plant.

Their individual treatment capacities and capabilities are varied, creating operating difficulties that have been largely overcome by re-circulation and by operating at concentrations below the normal desirable level. Simon-Carves have, therefore, endeavored to develop flowsheets which do not require undesirable disturbance of process flow streams whilst still ensuring that each process will be able to be operated at a characteristically acceptable level of performance.

Whilst engaged in this work, Simon-Carves were approached by Datap Systems to provide assistance with the design of a 10 tonne/hr heavy medium cyclone circuit for the C.R.L. Pilot Plant. This fortuitous occurrence resulted in close liaison between C.R.L., Datap Systems and Simon-Carves and the latter company provided a design based upon Dutch State Mines (D.S.M.) licenced technology upon which several hundred commercial coal preparation plants have been based over the past 25 years.

In addition to designing the new pilot scale plant, Simon-Carves, working closely with C.R.L., have provided for future addition of new equipment and circuitry in accordance with C.R.L.'s anticipated future research and development objectives. These include for the integration of a portable plant for fine coal beneficiation and the future addition of various dewatering units. Further development of instrumentation to extend plant control and experimental measurements is also anticipated as being a major future requirement. In this regard, Simon-Carves had

## 1.0 INTRODUCTION (Cont'd.)

recommended to the C.R.L. from the outset of the project, that a programmable controller (p.c.) plant control system be incorporated to replace the hard wired electro-mechanical relay system used in the current plant. C.R.L. agreed to this proposal and intend to develop an integrated p.c. system comprising individual controllers for each major circuit to perform specialized control functions, in addition to the main plant controller which will perform sequenced start-up and shut-down functions. Much of the software development for this total p.c. based system will be done gradually on an 'in-house' basis by C.R.L.

Simon-Carves believe that the overall plant design that has now resulted from their endeavors and the close liaison maintained with the C.R.L. will culminate in one of the finest coal cleaning pilot plants in the world today. It will also provide the sound foundation required for further development and expansion in the future.

SECTION 2

## 2.0 TECHNICAL DISCUSSION

### 2.1 Summary

The new coal preparation pilot plant facilities for Devon comprise two distinct areas:

- a raw coal sample reception, handling and crushing area; and
- an adjacent three level pilot plant area.

The raw coal sample handling and crushing area has a bulk sample drying and sub-sampling area located in an adjacent room to the point where the coal sample is loaded into the reception hopper at the feed point of the handling and crushing section. From the reception hopper, the coal is conveyed by two conveyors to the raw coal screening and crushing section where the top size is reduced from 75 mm to 10 mm. Another conveyor transfers the minus 10 mm coal to a 10 tonne raw coal feed bin located in the pilot plant area.

The pilot plant contains various alternative coal cleaning circuits which can be pre-selected to treat the coal at rates of up to 10 tonne/hr. Cleaning equipment can be divided into the feed size ranges:

- 10 mm x 0.6 mm: - which is referred to as coarse coal throughout the remainder of this report; and

- minus 0.6 mm: - which is referred to as fine coal.

Simon-Carves have identified 13 different alternative circuit options, of which six are regarded as primary and seven are regarded as secondary. See Table 2.1.1.

## TABLE 2.1.1
## AVAILABLE PROCESSING OPTIONS

| PROCESS OPTION NO. | PROCESSES | SIZE RANGE TREATED mm's |
|---|---|---|
| Primary 1 | Water-Only Cyclones | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Tailings Thickener | 0.1 x 0 |
| Primary 2 | Water-Only Cyclones | 10 x 0.6 |
| | Froth Flotation | 0.6 x 0 |
| | Tailings Thickener | 0.6 x 0 |
| Primary 3 | Batac Jig | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Tailings Thickener | 0.1 x 0 |
| Primary 4 | Batac Jig | 10 x 0.6 |
| | Froth Flotation | 0.6 x 0 |
| | Tailings Thickener | 0.6 x 0 |
| Primary 5 | Heavy Medium Cyclone | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Tailings Thickener | 0.1 x 0 |
| Primary 6 | Heavy Medium Cyclone | 10 x 0.6 |
| | Froth Flotation | 0.6 x 0 |
| | Tailings Thickener | 0.6 x 0 |
| Secondary 1 | Water-Only Cyclones | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Froth Flotation | 0.1 x 0 |
| | Tailings Thickener | 0.1 x 0 |

## TABLE 2.1.1 (Cont'd.)
## AVAILABLE PROCESSING OPTIONS

| PROCESS OPTION NO. | PROCESSES | SIZE RANGE TREATED mm's |
|---|---|---|
| Secondary 2 | Water-Only Cyclones | 10 x 0.6 |
| | H.M. Cyclone | Middlings |
| | Water Only Cyclones | 0.6 x 0.1 |
| | Tailings Thickener | 0.1 x 0 |
| Secondary 3 | Water-Only Cyclones | 10 x 0.6 |
| | H.M. Cyclone | Middlings |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Froth Flotation | 0.1 x 0 |
| | Tailings Thickener | 0.1 x 0 |
| Secondary 4 | Batac Jig | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Froth Flotation | 0.1 x 0 |
| | Tailings Thickener | 0.1 x 0 |
| Secondary 5 | Batac Jig | 10 x 0.6 |
| | H.M Cyclone | Middlings |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Tailings Thickener | 0.1 x 0 |
| Secondary 6 | Batac Jig | 10 x 0.6 |
| | H.M. Cyclone | Middlings |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Froth Flotation | 0.1 x 0 |
| | Tailings Thickener | 0.1 x 0 |
| Secondary 7 | Heavy Medium Cyclone | 10 x 0.6 |
| | Water-Only Cyclones | 0.6 x 0.1 |
| | Froth Flotation | 0.1 x 0 |
| | Tailings Thickener | 0.1 x 0 |

## 2.1 Summary (Cont'd.)

Coarse coal cleaning units are:
- H.M. Cyclone
- Batac Jig
- Water-only Cyclone (double or single stage)

Fine coal cleaning units currently incorporated in the circuits are:
- Water-only Cyclone (double or single stage)
- Froth Flotation
- (Oil agglomeration will be added in the near future)

Following cleaning by any coarse coal unit the resultant cleaned coal is dewatered by vibrating basket centrifuge and the discard by vibrating screen.

Cleaned coal emanating from the fine coal cleaning units currently passes with the coarse cleaned coal to the same centrifuge. In the future, other fine cleaned coal dewatering units such as vacuum filters will be introduced. Fines discard passed to a solid bowl centrifuge.

Slimes, fines slurry containing solids usually finer than 100 microns, are thickened in a high capacity thickener following treatment with polymer flocculants and the clarified water is re-used in the cleaning circuits. The thickened underflow joins the fines discard to be dewatered by the solid bowl centrifuge.

During operation, solid and liquid samples can be taken at all strategic parts of the flow circuit and many measurements will be possible from monitoring transducers of various types.

## 2.1 Summary (Cont'd.)

The operation of the plant (i.e., start-up and shut-down sequences, etc.) is to be totally controlled by p.c., whilst most circuits will also have independently controlled loops and on-line measurement systems for research purposes. These independent control requirements are to be provided by means of individual p.c. or microprocessors. The C.R.L. have contacted specialized control Consultants to provide the hardware and much of the software requirements for these systems. The heavy medium cyclone and froth flotation circuits are the two systems currently under development.

## 2.2 Raw Coal Handling Area

### 2.2.1 Flowsheet

The flowsheet for this area is given in SCAN Drg. No. C1835-04-0509.

Raw coal, normally sized below 150 mm, is loaded into the raw coal reception hopper (Item No. 4001) by means of a Bobcat loader. A 75 mm grid within the hopper prevents oversize material from passing to the primary Redler conveyor (Item No. 4002). This oversize material is broken by hand either before or on the grid as a normal operation whilst the plant is running. The two primary Redler conveyors (Item No.'s 4002 and 4004) are each capable of handling up to 20 tonnes/hr of minus 75 mm coal with a surface moisture range between 5 and 15% by weight.

From the head end of this second (horizontal) conveyor the coal is discharged onto a Ty-Rocket Double deck vibrating screen (Item No. 4006) fitted with a 10 mm aperture woven wire screen deck. This screen is capable of sizing at the maximum feed rate unless the amount of near 10 mm material is very high (i.e., + 20% ± 1 mm). Oversize material from the screen passes to an impactor crusher (Item No. 4010) which crushes to below 10 mm. The combined minus 10 mm raw coal passes to the secondary Redler conveyor (Item No. 4012) from where it is conveyed to the 10 tonne raw coal bin (Item No. 4051) located in the pilot plant area. Alternatively, the combined minus 10 mm raw coal can be re-directed to a sample skip, or bins for use elsewhere. C.R.L. and CMRC have jointly agreed to install an alternative raw coal crusher with variable setting at some time in the future. In order to cater for this, Simon-Carves have arranged the screen/crusher section to provide for this future addition by means of an additional re-directing chute, which would divert the screen oversize to the new crusher and the crusher product back into the combined raw coal chute described earlier.

### 2.2.2 Equipment

The equipment contained in the raw coal handling area is identified on the flowsheet and layout drawings (SCAN Drg. No. C1835-04-0509 Flowsheet; C1835-04-0516 and C1835-04-0517 Elevations; C1835-04-1510 Floor Plans); see Drawing Register in Appendix Three, and in the equipment list included in Appendix Two.

Items of new equipment requiring purchase by C.R.L. prior to relocation are:

| Item No. | Description | Estimated Cost |
|---|---|---|
| 4001 | Reception Hopper | 1,400.00 |
| 4002 | Primary Redler Conveyor 1 | 26,105.00 |
| 4004 | Primary Redler Conveyor 2 | 11,280.00 |
| 4006 | Screen (Ty-Rocket) | 10,110.00 |
| 4012 | Secondary Redler Conveyor | 16,708.00 |
| | Chute Work (Misc.) | 4,020.00 |
| | Total Cost | 69,623.00 |

Note: 1) all platework items have been estimated at $3.50 per kg. finished, painted and ready for shipment.

Note: 2) also required are equipment supporting structures not included in the above:

The following item of equipment is to be re-used:

| Item No. | Description |
|---|---|
| 4010 | Raw Coal Crusher (Gruendler) |

Future equipment items are:

| Item No. | Description |
|---|---|
| | Raw Coal Crusher (variable setting) |
| | Sample Skip (0.5 tonne to 1.0 tonne) |
| | Mass Flow Meter (load cell system) |
| | Sample Weighing Scale |

### 2.2.3 Steelwork

Because the building steelwork had been designed and installed prior to the commencement of the plant design, some modification to the building was inevitable. In addition to structural modification, the supporting steelwork for the equipment was also required. SCAN Drg. No.s C1835-04-4501 to C1835-04-4503 show the structural steelwork floor levels at EL+103.600 and EL+107.500. These drawings are listed in the Drawing Register in Appendix Three and copies are contained in the Drawing Portfolio.

### 2.2.4 Electrical and Instrumentation and Control

The raw coal handling area is to be fully controlled from the central control room located on the EL+103.600 floor of the pilot plant. In this regard, the general details provided later in Section 2.3.4 will be applicable to the raw coal area. Similarly, the references made to the various drawings which Simon-Carves have produced also apply. These are as follows:

Electrical: single line diagrams*
cable schedules
cable routing drawings

* It should be noted that these drawings contain some assumptions which will have to be confirmed in the field by the Electrical Installation Contractor at the time of bidding for the Relocation Contract.

Instrumentation: no specific instrumentation details have been produced for this area, although the system will respond to the status of filling of the 10 tonne raw coal bin in the pilot plant.

Control: logic diagram

### 2.2.5 Sampling

Much of the sampling required in this area will be carried out by manual methods, i.e., coning and quartering before the coal is introduced; hand sampling at the screen; grab sampling by diversion of the combined (minus 10 mm) raw coal chute. No automated facility is provided, but Simon-Carves have made allowances for an automated bucket sampler to be introduced into the screen oversize discharge chute and for a Local/Remote operated pneumatic cylinder to be added to the combined raw coal flop-gate.

### 2.2.6 Other Aspects Including Specific Relocation Requirements

The existing Devon building will require some structural steel and floor grating modifications to be made, mostly prior to the relocation of the equipment.

In addition to these structural changes, it will be necessary that the cold room located on the EL+107.500 floor level be relocated to the position specified in SCAN Drg. No.s C1835-04-1515 to 1517. This request was made to the Alberta Government Services Dept. in November 1982, but because of the contractual commitments of the main contractor at the Devon site, it was decided to defer the removal until after the building had been formally completed.

Simon-Carves recommend that the installation, testing and commissioning of the two Redler conveyors be a contracted part of the purchase of these items from Stephens-Adamson and that C.R.L. take note of the specified performance guarantees offered following purchase and described in detail in the estimate document included in Appendix One of this report.

### 2.2.6 Other Aspects Including Specific Relocation Requirements (Cont'd.)

We have carefully investigated the future requirements for this area of the pilot plant facilities and information pertaining to future needs is included or discussed in Section 3.5. All requirements, current and future, have been allowed for in the control facility which has been recommended.

Some relocation of building services will be necessary and we would recommend that consideration be given to installing some localized lighting, partly for safety reasons but also for improved observation of operations.

Simon-Carves have some concerns regarding the current flooring on the first and second floor levels. This type of decking is not ideally suited to plants of this type and it would be preferrable for it to be replaced with a grating of the type currently used in the Clover Bar plant. If this is not possible, care will need to be exercised in cutting out openings for equipment and piping. All openings will require strengthening with flat plate welded vertically into the opening to provide a reinforcing effect and possibly, also a safety curbing. Simon-Carves believe that this work will prove time consuming and costly and C.R.L. are strongly advised to investigate replacement in both the raw coal handling and pilot plant areas. See also Section 2.3.7.

## 2.3 PILOT PLANT AREA

### 2.3.1 Flowsheets

The main (total) flowsheet for this area is given in SCAN Drg. No. C1835-04-0508.

The pilot plant consists of five individual coal cleaning processes, these being:

a) heavy medium D.S.M. cyclone to clean 10 x 0.6 mm sized coarse raw coal;

b) water-only Tricone cyclones in two stages, to clean 10 x 0.6 mm size coarse raw coal;

c) Batac Jig to clean 10 x 0.6 mm sized coarse raw coal;

d) water-only Tricone cyclones in two stages to clean 0.6 x 0.1 mm sized fine raw coal;

e) froth flotation to clean either 0.6 x 0 mm or 0.1 x 0 mm sized fine raw coal.

The various options available within the pilot plant for cleaning coal using combinations of the above equipment are given in six optional flowsheets as follows:

| Drg. No. | Title |
|---|---|
| C1835-04-0514 | Coarse W.O. Cyclones and Fine W.O. Cyclones |
| C1835-04-0515 | Coarse W.O. Cyclones and Froth Flotation |
| C1835-04-0516 | Batac Jig and Fine W.O. Cyclones |
| C1835-04-0517 | Batac Jig and Froth Flotation |
| C1835-04-0518 | H.M. Cyclone and Fine W.O. Cyclones |
| C1835-04-0519 | H.M. Cyclone and Froth Flotation |

### 2.3.1 Flowsheets (Cont'd.)

Whilst the total flowsheet drawing displays maximum flow conditions which the plant as a whole will be likely to encounter whichever option is selected, the options flowsheets are balanced ones.

Much of the philosophy now incorporated in the development of these flowsheets is contained in the Progress Reports which Simon-Carves have provided for C.R.L. It is, therefore, not proposed to discuss the development aspects further, but instead to describe the flowsheets which have now evolved.

### 2.3.1. a) Total Flowsheet: SCAN Drg. No. C1835-04-0508

This flowsheet features all the components of the 10 tonne/hr pilot plant. All flows shown are maximum flows.

Raw coal sized below 10 mm is recovered from the 10 tonne bin (Item No. 4051) by means of the weighbelt feeder (Item No. 4121). At the base of the raw coal bin is located a moisture metering device which measures the surface moisture of the coal as it passes through the bin outlet.

The weighbelt feeder measures the flow rate from the bin. It is understood that C.R.L. intend to combine these two signals to obtain the air-dry feed tonnage to the process circuits.

The raw coal passes from the feeder to the raw coal mixing tank to which clarified water from the thickener is added, together with recirculated water from other locations.

The coal slurry, formed is then pumped by a variable speed pump (Item No. 4132), to the desliming sieve bend (Item No. 4093)/screen

## 2.3.1. a) Total Flowsheet: SCAN Drg. No. C1835-04-0508 (Cont'd.)

(Item No. 4101) combination. The oversize material can then take two alternative routes; it can pass directly into the Heavy Medium cyclone circuit; or to the mixing tank (Item No. 4053). From the mixing tank, after re-pulping, the slurry is pumped, again by a variable speed pump (Item No. 4133) to either the coarse coal water-only Tricone cyclone circuit or the Batac Jig circuit.

The desliming screen undersize material passes directly to the fines tank (Item No. 4056). Fine coal slurry from this tank is then pumped by another variable speed pump to the fine coal water-only Tricone cyclone circuit; or to the froth flotation circuit. All cleaned coal products, from whichever combination of processes selected, gravitate to the cleaned coal tank (Item No. 4065) to further gravitate to the pusher centrifuge (Item No. 4115). Dewatered cleaned coal is then collected from beneath the centrifuge in sample barrels.

All discard from the coarse coal circuit is dewatered by the coarse reject screen (Item No. 4155) and directed to sample barrels.

Slimes from the fine coal water-only cyclone circuit or tailings from the froth circuit gravitate to the high capacity thickener (Item No. 4114). Thickened underflow join fine rejects from the water-only cyclones in passing to the solid-bowl centrifuge (Item No. 4116). The cake from this machine is collected by sample barrels.

## 2.3.1 b) Coarse and Fine Coal Water-Only Tricone Cyclones: SCAN Drg. No. C1835-04-0514

This is a balanced flowsheet based upon the parameters given as follows:

| Raw Coal Size, mm. | Tonne/hr. Raw | Clean | Middlings | Discard |
|---|---|---|---|---|
| 10 x 0.6 | 7.0 | 5.6 | 0.7 | 0.7 |
| 0.6 x 0.1 | 2.0 | 1.8 | (0.25*) | 0.2 |
| 0.1 x 0.0 | 1.0 | 0 | 0 | 1.0 |
| 10 x 0 | 10.0 | 7.4 | 0.7 | 1.9 |

(* Rewashed)

The plant loading will vary depending upon the size distribution and washability characteristics of the raw coal.

Both cyclone systems (coarse and fine) comprise two stages of cleaning.

Raw coal is pumped from the raw coal mixing tank (Item No. 4053) directly to the first stage of the coarse coal water-only cyclones (Item No. 4081 & 4082). The cleaned coal product (overflow) then passes, under pressure, to hydrocylcone classifiers (Item No. 4084 & 4085), whereupon, the product is densified and passes to the cleaned coal sieve bend (Item No. 4096) to be further dewatered before gavitating to the cleaned coal tank (Item No. 4065). The primary water-only cyclone underflows are combined and pass to the secondary stage water-only cyclone (Item No. 4083) with the overflow either re-cycling via the mixing tank, or passing to the middlings sieve bend (Item No. 4094). Drained middlings from this sieve bend are then collected in sample barrels. The secondary

### 2.3.1 b) Coarse and Fine Coal Water-Only Tricone Cyclones: SCAN Drg. No. C1835-04-0514 (Cont'd.)

cyclone underflow passes to the coarse reject screen (Item No. 4105) which drains the rejects and they then pass to sample barrels.

All fines emanating from coarse coal circuits end up in the fines tank (Item No. 4056). From here they are pumped to the first stage of the fine coal water-only cyclones (Item No. 4086). As with the coarse coal circuit, the overflow passes directly to a hydrocyclone classifier (Item No. 4088) which thickens the fine cleaned coal before passing it to a fines dewatering screen (Item No. 4104), from which the damp cake overflow discharges to the cleaned coal tank (Item No. 4065).

The primary water-only cyclone underflow gravitates to a pump box (Item No. 4060) to be pumped, (Item No. 4140) to the next stage, i.e., the secondary water-only cyclone (Item No. 4087). Once again the secondary water-only cyclone overflow is re-directed to the raw feed whilst the underflow joins the thickened underflow and passes to the solid bowl centrifuge (Item No. 4116).

The secondary water-only cyclone overflow is shown routed back to the raw coal tank (Item No. 4052) in order to preserve a functional liquid balance for the cyclone circuits during operation. However, the secondary water-only cyclone overflow could, if required, be sieved to remove any fine coal prior to re-circulation to the raw coal tank. An inclined fixed sieve with an 0.25 aperture wedge wire surface, or alternatively a woven wire mesh sieve with a smaller aperture, would effectively remove these solids which would then gravitate into the fines tank (Item No. 4056) to be recycled with the fresh feed. This alternative may not, however, be necessary because the amount of solids is not expected to be significant when compared to the water only cyclone feed. SCAN Drg. No. C1835-04-05 indicates the position of the fixed sieve.

### 2.3.1 c) Coarse Coal Water-Only Tricone Cyclones and Froth Flotation: SCAN Drg. No. C1835-04-0515

This is a balanced flowsheet based upon the parameters given as follows:

| Raw Coal Size, mm. | Tonne/hr. Raw | Clean | Middlings | Discard |
|---|---|---|---|---|
| 10 x 0.6 | 6.0 | 4.8 | 0.6 | 0.6 |
| 0.6 x 0.0 | 2.0 | 1.7 | 0 | 0.3 |
| 10 x 0 | 8.0 | 6.5 | 0.6 | 0.9 |

The plant loading will vary depending upon raw coal size distribution and washability characteristics. Plant feed tonnage for this option is limited by the design capacity of the Denver froth flotation cells. This is 2 tonne/hr at a feed concentration of 10% solids by weight and 5 minutes minimum pulp residence time. For this reason also, Simon-Carves and C.R.L. have agreed that the Denver cells will not be operated divided into rougher/cleaner arrangement for which they were originally intended. Instead C.R.L. will utilize another set of pilot scale cells, to be purchased for a semi-portable test plant, for re-cleaning purposes. This is shown in circuit in the general (total) flowsheet SCAN Drg. No. C1835-04-0508.

The coarse coal water-only cyclone circuit is as described for the previous flowsheet. The flotation cells (Item No. 4113) are pump fed from the fines tank (Item No. 4056). Cleaned coal concentrates from all six cells gravitate to the cleaned coal tank (Item No. 4065). Tailings gravitate to the slimes tank (Item No. 4057), from where they are pumped (Item No. 4137) to the high capacity thickener (Item No. 4114).

## 2.3.1 d) Batac Jig and Fine Coal Water-only Tricone Cyclones: SCAN Drg. No. C1835-04-0516

This is a balanced flowsheet based upon the following parameters:

| Raw Coal Size, mm. | Tonne/hr. | | | |
|---|---|---|---|---|
| | Raw | Clean | Middlings | Discard |
| 10.0 x 0.6 | 4.0 | 3.2 | 0.4 | 0.4 |
| 0.6 x 0.1 | 1.3 | 1.0 | (0.2*) | 0.3 |
| 0.1 x 0.0 | 0.7 | 0 | 0 | 0.7 |
| 10.0 x 0.0 | 6.0 | 4.2 | 0.4 | 1.4 |

(* Rewashed)

The plant loadings will vary depending upon the size distribution and washability characteristics of the raw coal. The tonnage processed by this option is limited by the 4 tonne/hr maximum capacity of the Batac Jig.

Raw coal is pumped from the mixing tank to a further stage of desliming (Item No. 4106), whereupon, the oversize passes directly to the jig bed (Item No. 4111). Fresh water for both the screen and the jig feed points, if required, can be obtained directly from the main supply in order to avoid any disturbance of the jig bed. Cleaned coal overflowing from the jig passes to the cleaned coal sieve bend (Item No. 4096); middlings from the jig gravitate to the middlings sieve bend (Item No. 4094); and discard passes to the coarse reject screen (Item No. 4105). The latter two products, after drainage, pass to sample barrels, whilst the cleaned coal is first dewatered in the pusher centrifuge (Item No. 4115) before passing to sample barrels. Alternatively, middlings can be re-circulated for re-treatment if this is required.

The fine coal water-only cyclone circuit is as described for a previous flowsheet. Its cleaned coal is also directed to the pusher centrifuge.

### 2.3.1 e) Batac Jig and Froth Flotation Cells: SCAN Drg. No. C1835-04-0517

This is a balanced flowsheet based upon the following parameters:

| Raw Coal Size, mm. | Tonne/hr. Raw | Clean | Middlings | Discard |
|---|---|---|---|---|
| 10.0 x 0.6 | 4.0 | 3.2 | 0.4 | 0.4 |
| 0.6 x 0.0 | 2.0 | 1.7 | 0 | 0.3 |
| 10.0 x 0 | 6.0 | 4.9 | 0.4 | 0.7 |

(* Rewashed)

Plant loadings will vary depending upon the raw coal size distribution and washability characteristics. Tonnage maxima for the Batac jig and Denver froth flotation cells are 4.0 and 2.0 tonne/hr respectively.

Both circuits have been described in previous flowsheet options.

### 2.3.1 f) D.S.M. Heavy Medium Cyclone and Fine Coal Tricone Water-only Cyclones: SCAN Drg. No. C1835-04-0518

This is a balanced flowsheet based upon the following design parameters:

| Raw Coal Size, mm. | Tonne/hr. Raw | Clean | Middlings | Discard |
|---|---|---|---|---|
| 10.0 x 0.6 | 7.0 | 6.0 | | 1.0 |
| 0.6 x 0.1 | 2.0 | 1.8 | (0.25*) | 0.2 |
| 0.1 x 0.0 | 1.0 | 0 | | 1.0 |
| 10 x 0 | 10.0 | 7.8 | | 2.2 |

(* Rewashed)

### 2.3.1 f) D.S.M. Heavy Medium Cyclone and Fine Coal Tricone Water-only Cyclones: SCAN Drg. No. C1835-04-0518 (Cont'd.)

The plant loadings will vary depending upon the raw coal size distribution and washability characteristics. This combination however, represents the greatest treatment capacity for the pilot plant and Simon-Carves believe it to be the one which C.R.L. will probably utilize most in preparing cleaned coal bulk samples for coking and combustion test samples, etc.

Raw coal from the raw coal tank (Item No. 4052) is pumped to the desliming screen/sieve bend (Item No.s 4101 & 4093) which removes the fine coal. The screen oversize passes the H.M. feed tank (Item No. 4054) to which magnetite powder is also added via a feeder (Item No. 4122) and a feed launder (Item No. 4079). The correct medium for separation is pumped (Item No. 4134) directly to the 200 mm diam. D.S.M. heavy medium cyclone (Item No. 4089). Cleaned coal from the overflow is drained of magnetite by the sieve bend (Item No. 4091) and the drain and rinse screen (Item No. 4102). The second half of this screen is rinsed with fresh water pumped from the clarified water tank (Item No. 4062). Discards, from the H.M. cyclone underflow, pass to a sieve bend (Item No. 4092)/screen (Item No. 4103) combination,wwhich similarly drains and rinses away magnetite.

Medium, drained at the correct density of separation returns to the H.M. feed tank to be recirculated. Diluted medium from the sprayed section of each screen, gravitates to the dilute medium cone (Item No. 4055) to be pumped (Item No. 4135) to the magnetic separator (Item No. 4112).

Simon-Carves recommend that in order to ensure the highest level of process efficiency, a demagnetizing coil (Item No. 4166) be

### 2.3.1 f) D.S.M. Heavy Medium Cyclone and Fine Coal Tricone Water-only Cyclones: SCAN Drg. No. C1835-04-0518 (Cont'd.)

inserted through which the magnetic concentrates would be passed prior to the distribution box (Item No 4071). By means of this distributer, a two-way splitter and a nuclear density gauge, the operational density of separation can be finely controlled during cleaning; rapidly adjusted when required; and readily monitored throughout cleaning operations.

Make-up magnetite, to compensate for losses incurred in operation, can be readily supplied by the dry powder feeder system. At the specified operating capacity, consumption of magnetite is expected to be below 1.0 kg per tonne of raw coal pumped to the H.M. cyclone unit.

Cleaned coal passing from the drain and rinse screen falls into the cleaned coal tank (Item No. 4065) from where it is fed, along with fine cleaned coal, to the pusher centrifuge (Item No. 4115).

Discard is directed from the screen directly into sample barrels, although adequate space exists for a dewatering device to be incorporated later, if required.

The fine coal water-only cyclone circuit has been described for previous flowsheets.

### 2.3.1 g) D.S.M. Heavy Medium Cyclone and Froth Flotation Cells: SCAN Drg. No. C1835-04-0519

This is a balanced flowsheet based upon the following parameters:

| Raw Coal Size, mm. | Tonne/hr. Raw | Clean | Middlings | Discard |
|---|---|---|---|---|
| 10.0 x 0.6 | 6.0 | 5.1 | 0 | 0.9 |
| 0.6 x 0.0 | 2.0 | 1.7 | 0 | 0.3 |
| 10.0 x 0 | 8.0 | 6.8 | 0 | 1.2 |

The plant loadings will vary depending upon the raw coal size distribution and washability characteristics. The tonnage processed by this option is limited by the froth flotation cells which are rated to treat 2 tonne/hr at 10% solids concentration and 5 minute residence time.

Both of these circuits have previously been described.

### 2.3.2 Equipment

The equipment is contained in the pilot plant and is identified on the total flowsheet, each optional flowsheet and the layout and plan drawings. These latter drawings show the exact placement of all equipment in the pilot plant, i.e., SCAN Drg. No.s:

C1835-04-1500 to 1502 Floor Plan Drawings
C1835-04-1520 to 1524 General Arrangement Drawings

## 2.3.2 Equipment

For further details of drawings see Drawing Register in Appendix Three and the Drawing Portfolio. An equipment list containing details of all new and existing equipment is included in Appendix Two.

Items of new equipment requiring purchase for the Pilot Plant, prior to relocation is summarized as follows:

| Item No. | Description | Estimated Cost |
|---|---|---|
| 4051 | Raw Coal Bin | 14,000.00 |
| 4052 | Raw Coal Tank | 2,100.00 |
| 4054 | Heavy Medium Tank (DATAP Contract) | - |
| 4059 | Pump Box | 350.00 |
| 4060 | Pump Box | 1,580.00 |
| 4063 | Make-up Water Tank | 1,500.00 |
| 4065 | Clean Coal Tank | 700.00 |
| 4071 | Heavy Medium Distrib. (DATAP Contract) | - |
| 4072 | H.M. Splitter Box (DATAP Contract) | - |
| 4073 | Mag. Sep. Splitter Box (DATAP Contract) | - |
| 4074 | W.O. Cyclone Splitter Box | 550.00 |
| 4075 | Three-Way Distributers | 420.00 |
| 4076 | Fines Classif. Cyclone Splitter Box | 550.00 |
| 4079 | Magnetite Feed Launder | 150.00 |
| 4089 | D.S.M. H.M. Cyclone (Two Units) | 3,600.00 |
| 4092 | H.M. Discard Sieve Bend (H & P) | 1,520.00 |
| 4094 | Middlings Sieve Bend (H & P) | 1,879.00 |
| 4101 | Desliming Screen | 10,325.00 |
| 4103 | H.M. Discard Screen | 10,325.00 |
| 4132 | Pump-Raw Coal Tank (incl. motor) | 2,374.00 |
| 4132M | Variable Speed Drive (if selected) | 2,830.00 |
| 4133M | Variable Speed Drive (if selected) | 9,635.00 |
| 4136M | Variable Speed Drive (if selected) | 6,328.00 |
| 4140 | Pump-Secondary Drive (if selected) | 2,374.00 |
| 4141 | Pump-Cleaner Froth Cells | 4,880.00 |
| 4171/79 | Various Chutes and Misc. Platework | 2,975.00 |
| 4164/5 | Air Cylinders (2) (DATAP Contract) | - |
| 4166 | Demagnetizing Coil | 1,193.00 |
| | Total Cost | 83,718.00 |

Note:
1) all platework items have been estimated at $3.50 per kg finished, painted and ready for shipment.
2) programmable controller hardware and software is not included. A cost estimate obtained was $47,000 for the basic hardware and $26,500 for the colorgraphics equipment (Allen-Bradley).

## 2.3.2 Equipment (Cont'd.)

Table 2.3.1 shows a listing of screen plates required for all existing and new screens and seive bends in the pilot plant.

### TABLE 2.3.1
### SUMMARY OF SCREENING SURFACE REQUIREMENT

| Item No. | Description | No. of Decks | Manufacture | Aperture * | Wire Type | lengthxwidth Dimensions |
|---|---|---|---|---|---|---|
| 4006 | Raw Coal Screen | 2 | TY-Rocket (new) | 32mm upper<br>10mm lower | woven<br>woven | both 1220x610mm |
| 4093 | Desliming Sieve Bend | 1 | Dorr Oliver (existing) | 0.6 mm | (as existing) wedge | 2690x610mm |
| 4101 | Desliming Screen | 1 | TY-Rocket (new) | 0.6 mm | wedge | 1220x610mm |
| 4091 | H.M. Clean Coal Sieve Bend | 1 | Dorr Oliver (existing) | 0.6 mm | (as existing) wedge | 2690x610mm |
| 4102 | H.M. Clean Coal Screen | 1 | TY-Rocket (existing) | 0.6 mm | (as existing) wedge | 1220x610mm |
| 4092 | H.M. Discard Sieve Bend | 1 | Dorr Oliver (new) | 0.6 mm | wedge | 2690x610mm |
| 4103 | H.M. Discard Screen | 1 | TY Rocket (new) | 0.6 mm | wedge | 1220x610mm |
| 4104 | Fines Clean Coal Screen | 1 | Derrick (existing) | 100 m | (as existing) woven | 635x610mm |
| 4105 | Coarse Reject Screen | 1 | TY-Speed (existing) | 0.6 mm | wedge | 1220x610mm |
| 4094 | Middling Sieve Bend | 1 | Heyl & Patterson (new) | 0.6 mm | wedge | |
| 4096 | Cleaned Coal Sieve Bend | 1 | Dorr Oliver (existing) | 0.6 mm | wedge | 2690x610mm |
| 4106 | Jig Drainage Screen | 1 | Sweco (existing) | 0.6 mm | (as existing) woven | |

* Subject to confirmation

Note: 1) Refer to Equipment List for further details.
2) Wedge wire type: 1/8" ISOROD, BEXBY, ZIMMER or similar
3) Screen widths quoted are inside dimension of screen side plates and, therefore, a fitting allowance is required for the screen plate.

## 2.3.2 Equipment (Cont'd.)

Future equipment items are:

| Item No. | Description | Supplier (or Possible) |
|---|---|---|
| 4117 | Flotation Cells (cleaning) | Wemco |
| 4118 | Clean Coal Filter (vacuum) | Eimco, Dorr Oliver,etc. |
| 4119 | Fine Rejects Filter (pressure) | Parkson, Arus Andritz, etc. |
| 4120 | High Gravity Centrifuge | Sharples |
| 4125 | Oil Agglomeration | C.R.L./N.R.C. |
| 4126 | Shaking Table | Desiter |

## 2.3.3 Steelwork

The majority of the Devon building steelwork had already been erected when Simon-Carves were awarded the pilot plant design contract. Consequently, structural modification was inevitable,but the extent required could not be ascertained until all the equipment items had been more or less finally positioned. Fairly extensive re-arrangement and re-design of floor beams has proved to be necessary in order that the equipment could be positioned to permit the necessary operational flexibility required for the plant. Simon-Carves were subsequently awarded a variation to the original contract to permit them to re-design the floor beams on each of the two floor levels above ground floor and to design supporting steelwork for numerous equipment items. This work is contained in the following drawings:

SCAN Drg. No. C1835-04-3501 (Civil)
C1835-04-4501 to 3 (Structural)

It should be noted that in all of these drawings, numerous hole spacings have not been dimensioned. This is for two reasons: - for new equipment the exact foundation or support fixing bolt locations

## 2.3.3 Steelwork (Cont'd.)

drawings are provided by the supplier: for existing equipment it is advisable that the fixing bolt holes be drilled in the steelwork on-site following the placement of the equipment. Foundation bolts in the concrete floor should be grouted into position shortly before the equipment is installed.

The existing steelwork layout for the first and second mezzanine levels between column lines A and C and 4 and 5 will require extensive modifications to satisfactorily accommodate the new pilot plant equipment. This work will include removing the existing grating in most areas and reframing the structure as shown on the new floor framing plans. The existing steelwork that is to be removed in order to accommodate the new equipment and opening locations has been incorporated into the new framing plans and in addition, new framing material is required. The hoist well and stairs have been relocated, but the main framing on the column lines and the existing column locations will not require any change. The existing grating, if retained, will require extensive cutting and rework to provide for the new openings as shown on the grating cutouts drawing. Unfortunately, this type of grating is not readily amenable to cutting without some form of reinforcement being added.

The existing main beams and columns will adequately support the new equipment and all new beams have been designed for a uniform live load of 15.0 kN/m$^2$. The 15.0 kN/m$^2$ is intended to include for the relatively light equipment loads, except that the beams supporting the 10 tonne coal bin and the Batac jig were designed for the actual equipment load plus the live load. The existing W610 girders have been designed for a live load of 20.0 kN/m$^2$ and in all cases will amply support the new equipment loading.

### 2.3.3 Steelwork (Cont'd.)

In all cases we have endeavoured to re-use, wherever possible, the original floor beams in the pilot plant building at Devon.

The existing ground floor slab on grade is a 250 mm thick slab with two layers of 15 mm @ 300 mm reinforcing each way resting on 300 mm minimum thick compacted granular fill on the compacted existing clay subgrade. This construction will adequately support all equipment loads imposed by the new pilot plant including the thickener and the centrifuge. The new work on this floor involves pouring new pads for pumps, tank legs, centrifuge, etc., and in all cases, the new pads are dowelled into the existing slab.

### 2.3.4 Electricals, Instrumentation and Controls (Including Sequence Interlocking Systems)

The entire pilot plant, together with the raw coal handling area is to be fully controlled from the central control room located on the EL+130.600 floor of the pilot plant.

Simon-Carves have recommended that all interlocking and sequencing for normal plant operations should be controlled by a p.c., and guidance has been provided regarding this type of system.

## TABLE 2.3.2

## STARTERS AND BREAKERS REQUIRED FOR EXPANDED M.C.C.

| Equip. No. | H.P. | Description | Voltage | Size (Starter/Bkr.) |
|---|---|---|---|---|
| 4106M | 2 1/2 | Sweco Screen | Assumed to be 460V | Size 1 |
| 4111M | - | Batac Jig Controller (Feeder Only) | 460V | 30A Bkr. |
| 4114B-M | 3/4 | Thickener Rake | Assumed to be 460V | Size 1 |
| 4115C-M | 1 1/2 | C.C. Centrif.Oil Pump | 460V | Size 1 |
| 4117M | - | Port. Flot. Cells | 460V | 30A Bkr. |
| 4122M | - | Magnetite Feeder Control (Feeder Only) | 460V | 30A Bkr. |
| 4131M | 5 1/2 | Thickener U/F Pump | 460V | Size 1 |
| 4132M | 3 | Raw Coal Tank Pump Controller (Feeder Only) | 460V | 30A Bkr. |
| 4133M | 20 | Mixing Tank Pump Controller (Feeder Only) | 460V | 60A Bkr. |
| 4136M | 10 | Fines Tank Pump Controller (Feeder Only) | 460V | 30A Bkr. |
| 4135M | 5 | Dilute Medium Pump | 460V | Size 1 |
| 4138M | 2 | C.C. Centrate Pump | 460V | Size 1 |
| 4140M | 3 | Fines W.O. CYC Feed Pump | 460V | Size 1 |
| 4141M | 3 | 2nd Stage Flot. Cell Feed Pump | 460V | Size 1 |
| 4143M | 3 | Batac Jig Feed Pump | 460V | Size 1 |
| 4144A-M | 5 | Flocc. Make up Pump | 460V | Size 1 |

## 2.3.4 a) Motor Control Centre (MCC)

### Existing MCC

Simon-Carves have suggested that the existing MCC be moved to the new location, since it appears to be in good condition. New starters and feeder switches, along with the necessary structures (vertical sections) should be ordered to provide feeds to new and up-rated drives. The purchase order for new equipment should clearly state the type and serial No. of the existing MCC in order that Westinghouse can supply compatible equipment.

Table 2.3.2 shows a listing of starters/breakers required in addition to those shown on the original Westinghouse drawings (1761-278A-911 and 912). Simon-Carves would recommend a detailed field inspection be carried out either by the eventual relocation contractor or by C.R.L. electrical staff to determine the accuracy of the information provided on these drawings and other limited sources of supply. This inspection should be carried out before any material is purchased.

The following information was obtained from Westinghouse regarding the existing motor control centre, Type 11-350, Serial No. NV37298:

- built in Richmond, B.C. in 1972;
- originally sold to CANMET for testwork at Lingan Mines: (Coal Pilot Plant)
- components and vertical sections are still available for this style of MCC.

## 2.3.4 a) Motor Control Centre (Cont'd.)

### Incoming Power Supply

It is noted that the Single-Line Diagram produced for the new facility by Alberta Housing & Public Works indicates two MCC's (one 440 volts and one 208 volts), each of which has its own incoming supply. If C.R.L. decide that the existing MCC is to be re-used, it will only be necessary to provide a single 440 volts 3 phase supply to the MCC, since the MCC has a self-contained 440-208 volts transformer. Provision is also made to supply 110 volts for the limited amount of equipment in the pilot plant treatment circuits which require it.

## 2.3.4 b) Cabling and Cable Tray Systems

### Cabling

The Cable Schedules provided by Simon-Carves are based upon the use of multi-conductor "Teck" cables in ventilated aluminum cable tray with no spacing between cables. The cable used should be as follows:

- 600/1,000 volts Teck, stranded copper conductors, R90 XLPE insulation, inner jacket, interlocking aluminum armour and fire-retardant outer PVC jacket. A bare copper ground conductor is contained in each cable.

Cables should be fastened to the tray with nylon "Tyraps" every two metres horizontally and every one metre vertically.

Each end of every cable should be permanently tagged with the cable number. Each end of every control/indication conductor should be permanently tagged with the appropriate wire number.

### Cabling (Cont'd.)

Cables should enter equipment from below in process areas in order to avoid the possibility of water entering motors, devices, etc.

Cables should be terminated by means of watertight connectors, T & B, Burndy or Crouse-Hinds.

All conductors should be terminated on terminal blocks. "Marr" connectors should not be used for circuits other than lighting.

### 2.3.4 c) Control Devices

Each drive should be controlled by a local start/stop pushbutton, in addition to the central control, for maintenance purposes. Local stations should be housed in EEMAC 4X enclosures (watertight and corrosion-resistant).

The stop button should be operable at all times, whereas the start button should only be effective when the central control system has put that drive in the "local control" mode.

### 2.3.4 d) Plant Control System

### Cabling

The control cabling shown on the drawing (SCAN Drg. No.s C1835-04-7510 to 7513) is based on the limited information currently available. The existing equipment and connections should, therefore, be checked in great detail prior to finalizing the cabling and connections.

## Control Philosophy

Simon-Carves have suggested that plant operations should be controlled by a keyboard, or a touch-screen graphic, utilizing a p.c. It should be noted that we have not shown any cabling to the p.c., as the selection of the system has not yet been made.

Modifications will be needed in the existing control and indication circuits when C.R.L.'s control philosophy has been completely finalized and the p.c. equipment has been selected. In this regard, it is Simon-Carves' recommendation that the specification now formulated, as referred to in this report be issued to potential suppliers of the p.c. and associated equipment (e.g., Allen-Bradley and Modicon) for tender and eventual purchase. Simon-Carves would be pleased to provide a proposal for services for additional programming which will then be required.

## Plant Logic

We have provided a number of logic diagrams which indicate our recommendations with regard to interlocking of process equipment under thirteen alternative sets of operating conditions. Wiring will have to be provided from the p.c. input and output terminals to send and receive appropriate signals from the electrical equipment and devices.

The thirteen alternatives were given previously in Table 2.1.1 and in order to assist in reading the logic diagrams prints of the original option flowsheets have been marked-up with the simplified start-up sequence added. These are included in the Portfolio of Drawings.

### 2.3.4 e) Grounding

All electrical equipment and devices must be adequately grounded in accordance with the Canadian Electrical Code. Such equipment must also comply with requirements necessary for approval by the Alberta Electrical Protection Branch to CSA.

### 2.3.4 f) Variable Speed Drives

It will be noted that, due to the various operating modes which will be utilized, we have recommended that variable speed drives be provided for three pumps.

A.C. and D.C. variable speed drives are in general use for this type of application.

We recommend adjustable frequency A.C. drives for the pilot plant in order to avoid the use of D.C. motors which require considerably more maintenance (re brushes and commutators) than the standard A.C. motors which are used with adjustable frequency drives.

Refer to Appendix One for details of the recommended type.

## 2.3.4 g) Drawings

Simon-Carves have provided the following drawings:

| | |
|---|---|
| Electrical: | Single Line Diagrams<br>SCAN Drg. No. C1835-04-7501<br>Sheets 1 to 4 |
| : | Cable Schedules<br>SCAN Drg. No. C1835-04-7502<br>Sheets 1 to 17 |
| : | Cable Routing Drawings<br>SCAN Drg. No. C1835-04-7510 to 13, i.e.,<br>Raw Coal Feed, Power and Control Layout<br>(See Section 2.2.4)<br>Ground Floor, Power and Control Layout<br>First Floor, Power and Control Layout<br>Second Floor, Power and Control Layout |
| Instrumentation: | P and I Diagram<br>SCAN Drg. No. C1835-04-6501<br>(See also Drg. No. C1835-04-0511<br>Legend for the above) |
| Control: | Sequence Interlocking : Logic Diagrams<br>The logic diagrams are as follows:<br>SCAN Drg. No. C1835/E/SK 1 to 14<br>The marked-up prints are as follows:<br>SCAN Drg. No. C1835/E/SK 15 to 27<br>Further details may be obtained from the drawing register in Appendix Three and directly from the drawings contained in the Portfolio of Drawings. |

### 2.3.5 Piping

Simon-Carves have produced drawings showing pipework routing with each line being numbered and the pipe diameter noted.

These drawings are as follows:

| | |
|---|---|
| C1835-04-5501 to 03 | Plans on each floor level |
| C1835-04-5504 to 08 | Sectional elevations |
| C1835-04-6501 | P and I Diagram |

Table 2.3.2 gives this numbering system and Simon-Carves recommend that C.R.L. adopt a system of colour coding related to each of the primary circuit options for use when the piping is in place in the new plant. We have assumed that C.R.L. will re-utilize as much as possible of the existing piping at Clover Bar. It is understood that Schedule 80 polyethylene piping with Victaulic type couplings will be predominantly used and, in addition, we recommended that all small radius bends and most connector pipes from pump delivery to the main line are steel wired reinforced rubber (e.g., Linatex).

Direct feed lines to the processing cyclones, the H.M. Cyclone in particular, should be installed vertically to ensure minimal wear in operating the circuit. Assembly of the piping would be from the cyclone down to the pump, with a final rubber section between the end of the range and the delivery flange of the pump.

Table 2.3.3 shows Simon-Carves estimated pipe lengths for each diameter as specified in Table 2.3.2 and as shown in the pipework routing drawings. Allowance has been made for routing deviations, etc., but we believe the lengths stated will be of assistance to C.R.L. in determining the requirements for the new pilot plant after potential re-use of the existing Clover Bar pilot plant has been assessed and also in obtaining a cost estimate for new pipework.

## TABLE 2.3.3

## PIPE ROUTING NUMBERING SYSTEM

## PIPING LINE NUMBERS

1 Sheet of 7

| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 001 | 76 (3") | Raw Coal Tank Pump #4132 | Desliming Sieve Bend #4093 |
| 002 | 203 (8") | Desliming Screen Flopper Gate #4162 | Mixing Tank #4053 |
| 003 | 102 (4") | Mixing Tank Pump #4133 | Pulp Divider #4080 |
| 004 | 102 (4") | Line No. 003 | Sweco Screen #4106 |
| 005 | 76 (3") | Pulp Divider #4080 | W.O. Cyclones I #'s 4081 & 4082 |
| 006 | 76 (3") | W.O. Cyclone I #4081 | Classifier #4084 |
| 007 | 76 (3") | W.O. Cyclone I #4082 | Classifier #4085 |
| 008 | 102 (4") | Classifiers #'s 4084 & 4085 | 3 Way Distributor #4075 |
| 009 | 102 (4")/76 (3") | 3 Way Distributor #4075 | Raw Coal Tank # 4052 |
| 010 | 64 (2½") | Distributor #4075 | Line # 16 (To mixing tank #4053) |
| 011 | 102 (4") | Distributor #4075 | Line # 40 (C/C sieve bend #4096 U/Flow) |
| 012 | 76 (3") | W.O. Cyclones I #4081 & 4082 | W.O. Cyclone II #4083 |
| 013 | 76 (3") | Pulp Divider #4080 | W.O. Cyclone II #4083 |
| 014 | 51 (2') | Classifiers #'s 4084 & 4085 U/Flow | C/C Sieve Bend #4096 |
| 015 | 76 (3") | W.O. Cyclone II #4083 | Splitter Box #4074 |
| 016 | 76 (3") | Splitter Box #4074 | Mixing Tank #4053 |
| 017 | 76 (3") | Splitter Box #4074 | Middlings Sieve Bend #4094 |
| 018 | 51 (2") | W.O. Cyclone II #4083 | Line #41 (Batac Jig Rejects) |

2 Sheet of 7

| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 019 | 203 (8") | Desliming Screen Flopper Gate #4162 | H.M. Feed Tank #4054 |
| 020 | 64 (2½")/51(2") | H.M. Feed Tank Pump #4134 | H.M. Cyclone #4089 |
| 021 | (102 (4") ) | H.M. Cyclone #4089 | H.M. C.C. Sieve Bend #4091 |
| 022 | 203 (8") | C/C Screen Chute #4174 | C.C. Tank #4065 |
| 023 | 51 (2") | C/C Screen U/Pan #4152 | Line #30 (Distributor #4071 Feed) |
| 024 | 51 (2") | C/C Screen U/Pan #4152 | Dilute Medium Tank #4055 |
| 025 | (51 (2")) | Classifier #4085 U/Flow | C/C Sieve Bend #4096 |
| 026 | 203 (8") | Discard Screen Chute #4175 | Rejects Collection |
| 027 | 51 (2") | Discard Screen U/Pan #4153 | Line #30 (Distributor #4071 Feed) |
| 028 | 51 (2") | Discard Screen U/Pan #4153 | Line #24 (Dil. Med Tank #4055 Feed) |
| 029 | 64 (2½") | Dilute Medium Tank Pump #4135 | Mag. Sep. #4112 |
| 030 | 76 (3") | Mag Sep. #4112 Product | Distributor #4071 |
| 031 | 51 (2") | Distributor #4071 | H.M. Feed Tank #4054 (Via Launder # 4079) |
| 032 | 51 (2") | Distributor #4071 | Line #49 (H.M. Feed Tank #4054 Feed) |
| 033 | 25 (1") | Distributor #4071 | Line #32 |
| 034 | 51 (2") | Distributor #4071 | Splitter Box #4072 |
| 035 | 51 (2") | Splitter Box #4072 | Line #49 (H.M. Feed Tank #4054 Feed) |
| 036 | 51 (2") | Splitter Box #4072 | Line #24 (Dil. Med. Tank #4055 Feed) |

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| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 037 | 152 (6")/102(4") | Sweco Screen #4106 | Mixing Tank #4053 |
| 038 | 102 (4") | Batac Jig #4111 | C/C Sieve Bend #4096 |
| 039 | 102 (4") | C/C Sieve Bend #4906 | Clean Coal Tank #4065 |
| 040 | 152 (6")/102(4") | C/C Sieve Bend #4096 U/Flow | Thickener Feed Tank #4064 |
| 041 | 102 (4") | Batac Jig #4111 Rejects | Coarse Rejects Screen #4105 |
| 042 | 51 (2") | Coarse Rejects Screen U/Pan #4155 | Slimes Tank #4057 |
| 043 | 51 (2") | Mag. Sep. #4112 U/Flow | Splitter Box #4073 |
| 044 | 51 (2") | Splitter Box #4073 | Line #42 (Slimes Tank #4057 Feed) |
| 045 | 51 (2") | Splitter Box #4073 | Line #24 (Dil. Med.Tank #4055 Feed) |
| 046 | 102 (4") | Batac Jig #4111 Middlings | Middlings Sieve Bend #4094 |
| 047 | 76 (3")/51(2") | Middling Sieve Bend #4094 U/Flow | Mixing Tank #4053 |
| 048 | 203 (8") | Middling Sieve Bend Flopper Gate #4161 | Middlings Rejects Collection |
| 049 | 203 (8") | Middling Seive Bend Flopper Gate #4161 | HM Feed Tank #4054 |
| 050 | 102 (4") | Desliming Screen U/Pan #4151 | Fines Tank #4056 |
| 051 | 76 (3") | Fines Tank Pump #4136 | W.O. Cyclone #4086 |
| 052 | 76 (3") | W.O. Cyclone #4086 | Linatex Sep. #4088 |
| 053 | 76 (3") | Linatex Sep. #4088 | Fines C.C. Screen #4104 |

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| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 054 | 76 (3") | Linatex Sep. #4088 | Splitter Box #4076 |
| 055 | 51 (2") | Fines C/C Screen U/Pan #4154 | Line #54 (Splitter Box #4076) |
| 056 | 203 (8") | Fines C/C Screen Chute #4176 | Clean Coal Tank #4065 |
| 057 | 76 (3") | Splitter Box #4076 | Thickener Feed Tank #4064 |
| 058 | 76 (3") | W.O. Cyclone #4086 | Pump Box #4060 |
| 059 | 76 (3") | Pump Box Pump #4140 | W.O. Cyclone #4087 |
| 060 | 76 (3")/51 (2") | W.O. Cyclone #4087 | Raw Coal Tank #4052 |
| 061 | 76 (3")/38 (1½") | W.O. Cyclone #4087 | Fines Reject Centrifuge #4116 |
| 062 | 76 (3") | Branch Line, W.O. Cyclone #4086 Feed | Flotation Cells #4113 |
| 063 | 25 (1") | C/C Centrifuge Pump #4138 | Raw Coal Tank #4052 |
| 064 | 25 (1") | C/C Centrifuge Return | |
| 065 | 76 (3") | Branch Line From Line 057 - | Sala Pump #4141 |
| 066 | 102 (4") | Flotation Cell #4113 Tailings | Line 067 (Slimes Tank #4057 Feed) |
| 067 | 102 (4") | Flotation Cell #4113 Tailings | Slimes Tank #4057 |
| 068 | 152 (6") | Flotation Cell #4113 Product | Sala Pump #4141 |
| 069 | 152 (6") | Flotation Cell #4113 Product | C/C Tank #4065 |
| 070 | 25 (1") | Fines Centrifuge Pump #4139 | Thickener Feed Tank #4064 |

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| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 071 | 25 (1") | Fines Centrifuge Return | |
| 072 | 76 (3") | Slimes Tank Pump #4137 | Thickener Feed Tank #4064 |
| 073 | 25 (1") | Thickener Pump #4131 | Line #61 (Fines Centrifuge #4116 Feed) |
| 074 | 51 (2") | Thickener Pump Box Pump #4143 | Batac Jig #4111 |
| 075 | 25 (1") | Branch Line From Line #74 | Batac Jig #4111 |
| 076 | 102 (4") | Clarified Water Tank Pump #4142 | M/U Water Tank #4063 |
| 077 | 13 (½") | Fresh Water Line | Sweco Screen #4106 Spray |
| 078 | 13 (½") | Fresh Water Line | Batac Jig Spray #4111 |
| 079 | 51 (2") | Branch Line From Line 76 | Clean Coal Screen #4102 Spray |
| 080 | 19 (3/4") | Branch Line From Line 79 | Discard Screen #4103 Spray |
| 081 | 102 (4") | Flotation Cell Tailings (Line 067) | Sala Pump #4141 |
| 082 | 152 (6")/102 (4") | M/U Water Tank #4063 | Mixing Tank #4053 |
| 083 | 76 (3") | M/U Water Tank #4063 | Raw Coal Tank #4052 |
| 084 | 76 (3") | M/U Water Tank #4063 | Slimes Tank #4137 |
| 085 | 51 (2") | M/U Water Tank #4063 | Pump Box #4060 |
| 086 | 51 (2") | M/U Water Tank #4063 | Sala Pump #4141 |
| 087 | 13 (½") | M/U Water Tank #4063 | C/C Screen U/Flow Pan #4152 |

| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 088 | 152 (6") | Fresh Water Supply | Clarified Water Tank #4062 |
| 089 | 25 (1") | Fresh Water Supply | Flocculant Make-Up #4144 |
| 090 | 51 (2") | Flocculant Make-Up #4144 | Thickener #4114 |
| 091 | 152 (6")/102 (4") | M/U Water Tank #4063 O/Flow | Clarified Water Tank #4062 |
| 092 | 152 (6") | Thickener #4114 O/Flow | Clarified Water Tank #4062 |
| 093 | 102 (4") | Clarified Water Tank #4062 O/Flow | Floor Drain |
| 094 | 102 (4") | Pump Box #4060 O/Flow | Fines Tank #4056 |
| 095 | 102 (4") | Fines Tank #4056 O/Flow | Floor Drain |
| 096 | 102 (4") | Slimes Tank #4057 O/Flow | Floor Drain |
| 097 | 102 (4") | Clean Coal Tank #4065 O/Flow | Floor Drain |
| 098 | 102 (4") | Raw Coal Tank #4052 O/Flow | Floor Drain |
| 099 | 102 (4") | Mixing Tank #4053 O/Flow | Floor Drain |
| 100 | 102 (4") | H.M. Feed Tank #4054 O/Flow | Floor Drain |
| 101 | 102 (4") | Dilute Med. Tank #4055 O/Flow | Floor Drain |
| 102 | 76 (3") | Sala Pump #4141 | Wemco Cell Tie In (Future) |
| 103 | 64 (2½") | H.M. Feed Tank #4054 Return | |
| 104 | 76 (3") | Raw Coal Tank Pump #4132 Suction Line | |

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| LINE NO. | LINE SIZE | FROM | TO |
|---|---|---|---|
| 105 | 102 (4") | Mix Tank Pump #4133 Suction Line | |
| 106 | 76 (3") | H.M. Feed Tank Pump #4134 Suction Line | |
| 107 | 76 (3") | Dilute Medium Tank Pump #4135 Suction Line | |
| 108 | 102 (4")/76 (3") | Fines Tank Pump #4136 Suction Line | |
| 109 | 127 (5") | Slimes Tank Pump #4137 Suction Line | |
| 110 | 64 (2½") | C/C Centrifuge Pump Box Pump #4138 Suction Line | |
| 111 | 38 (1½") | Fines Reject Centrifuge Pump Box Pump #4139 Suction Line | |
| 112 | 76 (3") | W.O. Cyclone Pump Box Pump #4140 Suction Line | |
| 113 | Existing | Thickener Pump #4131 Suction Line | |
| 114 | 127 (5") | Clarified Water Tank Pump #4142 Suction Line | |
| 115 | 76 (3") | Clarified Water Tank Pump #4143 Suction Line | |
| 116 | 51 (2") | Sweco Screen #4106 O/Flow | Line 040 (C/C Sieve Bend #4096 U/Flow) |
| 117 | Existing | Thickener Feed Tank #4064 | Thickener #4114 |
| 118 | 152 (6") | Flctation Cell #4113 Product | Line 068 (Sala Pump #4141 Feed) |
| 119 | 152 (6") | Flotation Cell #4113 Product | Line 069 (C/C Tank #4065 Feed) |
| 120 | 25 (1") | Branch Line From Line #079 | Desliming Screen #4101 Spray |

## TABLE 2.3.4

## ESTIMATED PIPE LENGTHS

| Diameter mm | Inches | Length Metres | Feet |
|---|---|---|---|
| 25 | 1" | 44.3 | 145.4 |
| 38 | 1 1/2" | 10.3 | 33.8 |
| 51 | 2" | 106.3 | 348.8 |
| 63.5 | 2 1/2" | 18.6 | 61.0 |
| 76 | 3" | 131.6 | 431.6 |
| 102 | 4" | 138.2 | 453.4 |
| 127 | 5" | 1.4 | 4.6 |
| 152 | 6" | 17.2 | 56.4 |
| 203 | 8" | 23.2 | 76.1 |

## 2.3.6 Sampling

Much of the sampling required in the pilot plant will, at least at the outset, be carried out by manual methods. Hand sampling of screen oversize products using a scoop, has been accommodated by ensuring good access and an adequately wide chute; later introduction of automatic samplers would be readily achieved as the chutes have been designed with this in mind.

All other sample points have been noted on the total flowsheet (SCAN Drg. No. C1835-04-0510). Solids and liquids will be collected in either 45 gallon or 5 gallon sample barrel containers and every effort has been made to locate the larger sample collection points at the basement level and to use rubber hose connections to facilitate minimum spillage from spashing and barrel changeover. Wherever possible, a double chute arrangement has been adopted, which can provide alternate filling of sample barrels. In the future, we would recommend that C.R.L. install air cylinders of the type to be used on the splitter boxes to automate these samplers in switching from one barrel to the next. Activation could be effected by means of a floor operated switch close to the sample point. However, extreme care must be exercised in fitting air cylinders into these sample points, as a poorly designed system could lead to bias in the sample taking.

Ground floor sample barrel locations are shown on the SCAN Drg. No.s 1835-04-1500 to 1507.

Simon-Carves have given a considerable amount of thought to possible handling methods for sample barrels especially in the basement area of the plant, where only limited access is available in some places. We would recommend that C.R.L. discuss their needs with other users in the Devon Complex and in particular the CMRC and Carbonization areas. If some common system can be agreed upon whereby sample barrels, sample

## 2.3.6 Sampling (Cont'd.)

steps, etc. can be used throughout these centres, greater flexibility will be achieved. We understand that CMRC are considering a roller conveyor system over which barrels can be easily pushed from one location to another. Such a system would appear to also suit coal preparation requirements. One attractive feature to this system is that a simple weigh scale may be introduced within the roller tract to facilitate weighing of the barrels without the need for lifting. For local handling Simon-Carves recommend a simple dolly cart of the type shown in SCAN Drg. No. C1835/2/SK.346.

## 2.3.7 Other Aspects Including Specific Relocation Requirements

The two steel floors in the pilot plant building will require extensive modification as discussed earlier. It is recommended that as much of this be done prior to the commencement of relocation of the equipment from Clover Bar.

Also, the control room will require to be dismantled in order that steelwork and floor grating changes can be made. Once again, we recommend that the replacement of the existing floor grating with grating similar to that used at Clover Bar be seriously considered.

Simon-Carves recommend that the installation, testing and commissioning of the following items of new equipment be a contracted part of the purchase and specified performance of duty be carefully noted prior to the placement of an order.

- all new vibrated screens and sieve bends
- the heavy medium cyclone circuit components

### 2.3.7 Other Aspects Including Specific Relocation Requirements (Cont'd.)

Regarding the H.M. cyclone circuit, which Simon-Carves have designed for DATAP Systems, we recommend that this circuit is properly commissioned and tested in accordance with the normal standards for acceptance of this type of plant. We will be able to provide technical assistance in such a matter at the appropriate time at the prevailing charge rates for commissioning personnel.

We have carefully investigated, with C.R.L.'s assistance, the future needs of the pilot plant and information related to these future needs is included or discussed later in Section 3.5 All requirements, current and future, have been allowed for in the control facility which has been recommended and specified in this report.

Fairly extensive relocation of building services will be needed and Simon-Carves would recommend that consideration be given to installing some further localized lighting for safety reasons, but also for improved observation of operations, and particularly for sampling points.

Careful checking will be required to ensure that all safety facilities are located in the most effective position now that the equipment positioning is more or less finalized. Also, eye washes will be required in close proximity to the places where reagents are used, i.e., flotation cells, thickener, flocculant mixing, etc.

## 2.4. GENERAL ASPECTS

### 2.4.1 Current Pilot Plant Features at the Clover Bar Location

The equipment list in Appendix Two, gives an indication of the amount of equipment, etc., currently located in the Clover Bar plant which will be re-utilized at Devon.

Simon-Carves have endeavoured to maximize re-utilization and in this regard we believe that we have, as a result of the close liaison with C.R.L., been very successful. Only the old raw coal conveying system has been completely retired from further service.

All existing slurry tanks will be re-utilized, some after modification and Simon-Carves would recommend that all tanks, boxes, etc., be refurbished as far as possible at Clover Bar prior to removal to Devon. Some consideration regarding lining, partly for wear protection but also to minimize corrosion should be afforded to refurbished items in particular.

We have compiled a collection of documents pertaining to the components of the current plant, many of which were provided originally by C.R.L., during the course of our preliminary investigations in and around the pilot plant. These we will be submitting with our final report and we believe that C.R.L. may wish to compile an inventory of all plant components in readiness for the move to the Devon site.

Finally, we have determined the necessary details of the existing motor control centre and we suggest that this MCC could be moved to the new location for re-use with subsequent expansion to incorporate starters and feeder switches for the new equipment. However, we recommend that localized start/stop pushbuttons, in addition to the p.c. central

### 2.4.1 Current Pilot Plant Features at the Clover Bar Location (Cont'd.)

control, be introduced and some salvaging of items such as pushbuttons, etc., may be possible. All cabling required for the new plant should be new and Simon-Carves believe that this is the advisable approach for C.R.L. to take in order to minimize any commissioning problems with the new plant.

### 2.4.2 Current Pilot Plant Features at the Devon Location

Extensive secondary steelwork modifications are required for the two above ground floor levels in the pilot plant together with some secondary steelwork modifications to the corresponding floors in the raw coal handling area. These modifications have been specified and are discussed in detail in Sections 2.2.3 and 2.3.3 of this report.

Simon-Carves recommend that these modifications be carried out as soon as possible and before the relocation programme is commenced. Also, it would be advisable to leave the replacement of floor grating in the pilot plant area in particular, until the relocation programme gets underway. In this way, the major equipment items and their supporting steelwork can be positioned and the exact floor grating modifications will have, by that time, become obvious.

This also applies to the control room which will probably require to be partly or possibly even completely dismantled in order that the flooring be removed and steelwork modifications effected.

The control room should be reassembled when the MCC and other electrical equipment is at the site, so that incoming and outgoing cabling can be properly located. We have, for example, noted that the current location of conduit for incoming cables is not in the most desirable position. It will probably require to be re-located to the

## 2.4.2 Current Pilot Plant Features at the Devon Location (Cont'd.)

opposite side of the control room where the MCC is more likely to be installed, thereby allowing the operational control desk to be located more centrally within the plant for better visual access of the plant.

Finally, new light fixture and power point locations, etc., should be decided upon during the relocation programme, together with the positioning of safety switches, fire alarms and other safety and emergency facilities.

Some new local lighting additions are advisable for safety and observation purposes.

Simon-Carves would reiterate the recommendation made earlier that replacement of the current flooring for a type similar to that used at Clover Bar will provide a better working surface, more suited to the type of plant, and also will probably be more readily modified to accommodate equipment, pipework and power cable installation and any changes required in the future.

## 2.4.3 Future Pilot Plant Requirements

Simon-Carves have maintained a constant dialogue with C.R.L. regarding future needs and the projected Research and Development objectives both in the short and long term.

We have incorporated into our design provision for inclusion of several identified items of equipment and some unidentified ones related to future proposed work.

The spacing of the floor levels in the new building, with relation to the respective floor areas available at each level have placed some constraints upon future accommodation of such equipment.

## 2.4.3 Future Pilot Plant Requirements (Cont'd.)

The ground floor is already congested with currently proposed equipment and in the future new process circuits in particular, may have to be located on the floors above, to facilitate good access and testing capabilities.

C.R.L. plan to develop a portable fine coal cleaning plant which can be located at mines and operated on feeds bled from the main plant. This pilot scale unit, when not in use at a mine, will be amenable to operation from the Devon Pilot Plant central control and located adjacent to the plant. Some of the equipment to be installed in the portable plant will be alternatively accommodated within the Devon Pilot Plant. Included in these items is the Wemco froth flotation cell bank which will be used for re-cleaning rough concentrates from the existing Denver cell bank.

C.R.L. in liaison with CMRC, anticipate purchasing in the future, another raw coal crusher to be located in parallel with the existing machine. Provision has already been made for this new machine. Also, C.R.L. anticipate the need to utilize CMRC's coal drying facilities to dry especially wet bulk samples prior to treatment in the pilot plant. Sample skips which will permit transfer to and from the CMRC plant have been investigated.

Every effort has been made to facilitate future improvement or refinement of sampler points. Although it appears likely that at the outset most sampling will be manually carried out, the majority of sample points have been designed so as to provide for varying degrees of automating the taking of samples. Most screen and chute locations, for example, would permit the introduction of remote, automatic sample cutters. Whilst several vertical pipe samples could be automated by means of air cylinders.

## 2.4.4 Total Plant Control System Requirements

Simon-Carves have recommended that all plant operations should be controlled by a keyboard utilizing a programmable controller connected to a suitably expanded original MCC.

We suggest that the plant be controlled by this keyboard and CRT (or, in the case of Modvue, by touch-screen CRT), thus eliminating the need for a control desk which would require modification whenever a physical change is made to the plant.

All valves, motors and gates would be directly connected to I/O modules to provide the CPU with status and position data. In the case of initiation of starters, solenoids, indicating lights and the like, the I/O modules would provide 120 volts A.C. power for operation of the appropriate devices in accordance with the program.

Selection of plant modules, e.g., Jig, Cyclones, H.M. circuit, Flotation, etc., in various required combinations would then be readily accomplished by appropriate programming and keyboard operation.

The existing Hewlett-Packard computer could be connected via a data highway to the CPU for transmission of data and commands in both directions. The computer could be utilized for data logging. Other computer or p.c. driven circuits could be connected in similar fashion.

Colour graphics should be programmed "page by page" as required to show all plant variables and status in a mimic diagram format.
Consideration should be given to programming each circuit on a separate "page" for convenience and clarity. Analog control loops (e.g., levels and densities) can be controlled from the keyboard and dynamically represented on the CRT.

## 2.4.4 Total Plant Control System Requirements (Cont'd.)

The speed of plant operation will depend on the quantity of memory programmed into the CPU and the Baud rate selected, but in any case it is expected that a full scan of the entire CPU system will take less than one second.

P.c.'s have been in use in coal preparation and other industrial plants for several years, and their acceptance has become almost universal. P.c.'s can carry out all of the functions previously requiring hard-wired relays, and in addition they are capable of providing a wide range of other functions including data logging, computation, keyboard control, colour CRT graphics, analog loop control and communication via data highways with computers and other p.c.'s.

Since all sequencing, interlocking, timing, counting, analog loop control and the like is carried out with "software", p.c.'s are particularly useful in plants where equipment additions and changes can be expected and where multiple choices of operating modes are required.

We have chosen to evaluate the Allen-Bradley and Modicon systems in view of their reputation as leaders in the field in building p.c.'s of the size and complexity required for your facility. We have used both types in the past, and believe that they should be considered technically equal for use in this application.

SECTION 3

## 3.0 CONCLUSIONS AND RECOMMENDATIONS

### 3.1.1 Relocation Requirements

Considerable thought and planning must go into this part of the programme. A significant cost will be incurred between the time that the existing facility is closed and the new facility is open and ready to carry on with its regular business.

This final report is intended to describe the Devon facility and its functioning. It is not, nor was it intended to be, a specification for the construction of the new facility. It is, however, the basis of the work that now has to be done for the completion of the project.

The existing facility contains a considerable number of items of equipment that are to be re-used in the new Devon facility. These items should be removed from their present location, cleaned, repaired, if necessary, and delivered to storage at Devon, all done by C.R.L. for reinstallation by the Contractor. At this point it is important to define the roles of the various parties, so that there will be no misunderstanding as to who is expected to do what and the scheduling of these works.

C.R.L., as the Owner, will be responsible for selecting the Contractor and the Engineer.

The Contractor will be responsible for supplying all field labour, materials of construction (except where specified otherwise) and all equipment required to accomplish the construction. He will also be required to verify existing electrical and instrumentation wiring prior to finalizing the details of cabling and connections for the new plant.

The Engineer will be responsible for supervising the Contractor and ensuring that the facility is built in accordance with the drawings, construction specifications, schedule and in a safe and workmanlike manner.

### 3.1.1 Relocation Requirements (Cont'd.)

C.R.L. will be responsible for supplying all of the equipment and materials that are to be re-used from the existing facility and any other equipment and materials.

The work to be performed by the Contractor has to be clearly specified, for several important reasons:

- so that the Contractor can estimate the required quantities of material and labour, in order to submit a meaningful tender;
- so that all tenders will be based on identical requirements and will, therefore, be on a comparable basis. This should keep the price spread between bidders to within an acceptable limit. This will give confidence to C.R.L., that the bids are realistic, and that bidders, within the accepted price spread, have interpreted the intent or scope of the work correctly; and
- so that the funds appropriated from DSS for the move will be adequate, without needing additional funds due to the Contractor's claim for extras, which could be legitimate if his scope of work is not adequately and clearly defined at the tender and award of contract stage.

The Engineer could be selected from C.R.L.'s own staff or, and preferably, be from an independent company with experience in this aspect of construction. The Engineer will ultimately, be responsible for the satisfactory completion of the facility and should be completely familiar with the requirements. The Engineer working alone or in conjunction with C.R.L.'s staff will be responsible for start-up of the plant and ensuring that the design conditions are achieved.

### 3.1.1 Relocation Requirements (Cont'd.)

Some of the specific items that should be considered are as follows:

#### Mechanical Equipment (Existing)

After the shut-down of the existing facilities, all equipment to be re-used should be removed, repaired and refitted (if required), cleaned, painted, tagged and delivered to the Devon site, at no cost to the Contractor. Installation manuals and drawings, if available, should also be made available to the Contractor during reinstallation.

#### Mechanical Equipment (New)

All new proprietary equipment has to be properly identified and delivered to the site at no cost to the Contractor. It should be received in the same condition that the Contractor was led to believe it would arrive, or there could be additional charges incurred.

This typically happens when an item is expected to arrive assembled and it arrives un-assembled.

#### Piping

There is a considerable amount of piping, valves, couplings, etc. in the existing plant that will be re-usable. In the case of the piping, it may be that the random lengths will not be suitable for the new installation without an extensive number of joints. During the tender stage, Contractors should be given the option of using new or existing pipe, as they will consider the economics of additional field labour for re-using the existing piping. Valves, couplings, elbows, etc., should be removed, cleaned and repaired, tagged and made available for the Contractor at no cost.

### 3.1.1 Relocation Requirements (Cont'd.)

#### Structural Steel

As part of our contract, we have re-arranged the steel framing to suit the requirements of the equipment layout. As the building is now complete and in a 'ready to occupy' condition, we recommend that the Contractor is requested to include the changes in his bid, with allowances for final field modifications. The steelwork that has been purchased by C.R.L. can be provided to the Contractor as free issue.

If the steelwork is modified as a separate contract, prior to the mechanical installation, there is every possibility that further changes will still be required to suit the existing equipment.

#### Concrete

Similarly as with the structural steel, modifications are required to the concrete floors which are already poured. To provide new foundations is relatively simple as it requires breaking into the existing floor, dowelling and adding the necessary equipment foundations. Again, this work should be the responsibility of the Contractor, so that the work can be properly coordinated in the field, using some of the manpower that will already be available on site for other tasks.

#### Electrical

There is virtually nothing from the existing facilities that can be re-used, with the exception of the MCC, the electric motors, and possibly some of the electrical components such as stop/start buttons, breakers, etc.

### 3.1.1 Relocation Requirements (Cont'd.)

#### Electrical (Cont'd.)

It has been our experience that re-using cable and cable trays is not economical, and it is best left in place for whatever salvage value that can be realized.

#### Instrumentation

Similarly as with the existing equipment, any existing instrumentation that is to be re-used in Devon, should be removed, repaired, cleaned, tagged and delivered to the site at no cost to the Contractor.

In summary, our strong recommendation is that C.R.L. should engage one Contractor to be responsible for all of the following:

- mechanical installation
- piping installation
- structural steel
- concrete
- electrical
- instrumentation
- assistance for plant start-up and testing

All of this work should be awarded by fixed price tender, based on a detailed construction specification, which clearly specifies the scope of work and the responsibilities of the Contractor.

All of this work should be supervised in the field, by an Engineer, who will also be responsible for the start-up, prior to handing the plant over to C.R.L.

### 3.1.1 Relocation Requirements (Cont'd.)

Simon-Carves would be pleased to offer services for any, or all, of the following:

- write the bid construction specification
- bid on the construction work
- act as the Engineer

## 3.2 OPERATIONAL REQUIREMENTS

We believe that we have provided flowsheets which are based upon the realistic capacities of the individual process units and although the total flowsheet, showing more or less maximum flow conditions, is a useful reference for all pilot plant activities we would advise that the individual option flowsheets represent the best indication of normal operating conditions.

Prior to using the raw coal handling facilities the raw coal should be dried to within the range specified for the Redler conveyors and all coarse lumps should, wherever practicable, be hand knapped to pass through the reception hopper grid, in preference to breaking on the grid itself.

This would preserve the continuity of flow through the plant and utilize the maximum transporting capabilities of the Redler conveyors.

We have been advised by Stephens-Adamson that the Redler conveyors when shut down normally, do not retain more than a thin layer of residual material and this can, if required, be cleaned out from the conveyor by means of compressed air. Some access doors can be installed close to the bends to facilitate this cleaning operation but these must be specified as a requirement when an order is placed.

In the pilot plant, every effort has been made to provide for operational conditions as close to uniform as possible. Prior to operation the raw coal should be tested as follows:

- feed size distribution using a raw coal sample obtained from the sample bypass (Item No. 4011);

## 3.2 OPERATIONAL REQUIREMENTS (Cont'd.)

- float-sink washability tests on similar sample material, together with froth flotation bench tests and in special cases (i.e., raw coals with known clay problems) settling tests from potential thickener feed samples.

These data will permit the best possible operating conditions to be obtained for the plant as a whole.

Individual circuits have further special requirements.

In the H.M. cyclone circuit provision has been made to either reduce or increase the density of the medium dependent upon operating conditions and the required density of separation for the test as indicated by the washability data.

Dilution is achieved by adding fresh water to the circulating medium. Concentration is achieved by diverting circulating medium to the dilute medium cone (and hence the magnetic separator) by means of a splitter box and funnel. These changes are controlled and monitored continuously by means of the nuclear density gauge (located beneath the distribution box) and its associated controller, in accordance with the pre-selected set-point. In order to effect a wide range change in density, the same circulating stock of magnetite would be utilized wherever possible but for concentration, more make-up magnetite may be required and in such cases the feeder would be manually or automatically activated to make-up the circulating stock to the required level.

Normally, make-up would be provided on an on-going basis in order to compensate for loss during coal washing. An allowance of approximately 1 kg/tonne of raw coal cleaned in the circuit would be adequate for this purpose.

## 3.2 OPERATIONAL REQUIREMENTS (Cont'd.)

The design range is 1.40 to 1.80 relative density of the medium. For this range the adjustment time required for the change to take place and for steady state conditions to be restored at the new density level would not normally exceed 45 minutes and would usually be less than this time period.

C.R.L. have experience of the operating requirements of the other circuits but some modifications have been made which will result in better, more economical use of water flows with almost total elimination of "rogue" bleeds and undesirable recirculation which were necessary at Clover Bar in order that the circuits could function. It will now be possible for C.R.L. operators to select and control to an ideal solids concentration without fear of prejudicing other process circuits or causing spills and overflows.

Training in the start-up/shut-down and operating procedures for this new plant is strongly recommended and C.R.L. are advised to consider producing an operating manual for the plant.

The ideal time for doing this would be to commence during the early stage of commissioning.

## 3.3 COMMISSIONING REQUIREMENTS

Following completion of the mechanical work, i.e., when all contracted work is complete and the plant is ready for commissioning, mechanical acceptance will be sought from the C.R.L. by the Contractor(s).

This would result from satisfactory testing under 'dry' conditions of all mechanical and electrical aspects of the work and would normally comprise the following:

a) removal of all foreign material from chutes, launders, underpans and pipelines;

b) checking for necessary clearances on all moving vibratory equipment;

c) operational tightness testing or structural steel, phase work and vibrating equipment;

d) adjustment and test running of all safety devices;

e) checking of all gear boxes for cleanliness; flushing out with recommended agents and charging or re-charging with correct oil;

f) instigation of lubrication checking in compliance with requirements specified by new equipment suppliers;

g) checking pumps for direction of rotation;

h) insulation testing of electrical cabling;

i) checking motor rotation;

## 3.3 COMMISSIONING REQUIREMENTS (Cont'd.)

j) completion of installation of all guards, hand railing and kick-plates for safe operation;

k) dry running of all equipment, i.e., conveyors, screens, centrifuges for a minimum period of five hours prior to "on-load" conditions; and

l) checking instrumentation and sequence interlocking system software.

Once all these items have reached a satisfactory level, "mechanical completion" will permit the "commissioning phase" to commence with the "wet" commissioning of all circuits in the plant followed by "process" commissioning leading to cleaning coal.

Wet Commissioning comprises the following items:

a) testing all pipe runs by circulating water;

b) operational tightness testing at couplings and joints;

c) checking pumps for direction of rotation, etc.

d) carrying out a trial run involving all equipment and checking the sequence interlock systems throughout the physical plant; and

e) filling of the thickener from make-up water supply and circulation for necessary flow; and water tightness tests throughout the plant.

## 3.3 COMMISSIONING REQUIREMENTS (Cont'd.)

Process commissioning comprises the following:

a) prepare to operate the H.M. cyclone circuit by the following steps:

  (i) commission dry magnetite feeder system and prepare 1.5 tonnes of magnetite;

  (ii) fill all tanks to correct level and add magnetite to the correct medium tank using the feeder system;

  (iii) circulate medium through the entire system and check for flow continuity;

  (iv) check all level indicators and recorders;

  (v) calibrate and zero the gravity controller and indicator using a density measuring container and analytical balance;

  (vi) balance the circuit to a predetermined relative density and run for a minimum of two hours;

b) prepare to operate all other circuits by circulating water throughout each circuit and checking flows; adjusting sieve bends; and generally ensuring good distribution;

c) feed coal at 25%, 50%, 75%, 100% tonnage. Complete instrument calibrations; check density calibrations; check process performance; check screen losses; magnetic separation operation; centrifuges, splitters, level controls, indications, interlocks, etc.

## 3.4 START-UP REQUIREMENTS

Simon-Carves recommend that the following materials be obtained prior to start-up for commissioning and initial pilot plant operations:

a) Magnetite: a two tonne stock of pre-ground magnetite to the following specification will be adequate to start-up the circuit and last for almost one year at normal consumption:

% magnetic content = >95%
% minus 200 mesh = >95%
% surface moisture = <10%

b) Flocculants: as currently used, but liquid polymer solutions are recommended for convenience. Fresh stock on start-up.

c) Flotation Agents: as currently used, but fresh stock on start-up.

d) Oils and Lubricants: as directed by suppliers of new equipment.

e) Test Equipment: calibrated density balance, test magnet, analytical balance, sampling equipment, electrical and instrumentation testing equipment, etc.

f) Emergency Spares: vee belts, alternative drive pulleys, orifice plates, spare valves, electrical and instrument spares, etc.

g) Raw Coal: C.R.L. should reserve a tonnage of raw coal of not less than 50 tonnes.

## 3.5 PROVIDING FOR FUTURE NEEDS

Every attempt has been made to cater for the future equipment and test requirements of the pilot plant as a research and development laboratory.

Included in such provisions are the following:

a) Addition of further process circuits, including:
  - extra stage of froth flotation
  - introduction of oil agglomeration
  - addition of shaking table and/or other flowing film concentrators such as Reichert Cone, Humphreys Spiral, etc.

b) Addition of further ancillary equipment, including:
  - addition of a variable setting raw coal crusher
  - addition of a centrifugal dewaterer(s)
  - addition of vacuum or pressure filter(s)
  - introduction of automatic sampling

c) Addition of further control equipment:
  - expansion of control monitoring equipment, i.e., froth flotation control, etc.
  - addition of further density measurement equipment
  - addition of further flow meters, etc.

d) Other additions:
  - compatibility with existing tailings treatment portable test unit
  - compatibility with future fine coal treatment portable test unit.

SECTION

4

# APPENDIX

## CONTENTS

One New Equipment Details and Estimates
Two Equipment List
Three Drawing Register

# APPENDIX ONE

## NEW EQUIPMENT DETAILS AND ESTIMATES

### Detailed Contents

| Item No. | Description | Date Obtained |
|---|---|---|

See Equipment List (under Remarks)

# APPENDIX TWO

# EQUIPMENT LIST

## APPENDIX TWO

## EQUIPMENT LIST

### Introduction

These lists have been compiled as the work has progressed and in their current final form provide valuable details of the following:

- SCAN Item No.
- Reference Description
- Quantity/Discipline and Weight (where applicable)
- Equipment Estimated Cost (where available or applicable)
- Supplier/Suppliers Drg. No. (where applicable)
- SCAN Drg. or Sketch No. and Appropriate Layout Number
- Any Revision Made During Progress with the Work
- Space for any Pertinent Comments

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 1 OF 3

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY | DISCIPLINE | WEIGHT | EQUIPMENT COST | SUPPLIER | SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO. | LAYOUT DWG. NO. | REVISION | DATE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4001 | Feed Hopper<br>c/w Grizzley | One | Platework | [illegible] | [illegible] | | | C1835-2/SK301 | C1835-4-1515 | 2 | MAR '83 | NEW |
| 4002 | Redler "L" Type Conveyor<br>3002/315 'U' | One | Mechanical | [illegible] | $26.165.00 | Stephens-Adamson | | | C1835-4-1515 | | | NEW |
| 4003 | Discharge Chute | One | Platework | [illegible] | | Stephens-Adamson | | | C1835-4-1515 | [illegible] | [illegible] | NEW<br>[illegible] |
| 4004 | Redler Conveyor (Horizontal)<br>3002/250 'T2' | One | Mechanical | [illegible] | [illegible] | Stephens-Adamson | | | C1835-4-1515 | | | [illegible] |
| 4005 | Screen Feed Chute<br>c/w Flop Gate | One | Mechanical | 0.15 t | $ 520.00 | | | C1835-2-SK303 | C1835-4-1515 | 2 | [illegible] | [illegible] |
| 4006 | Screen<br>Sizing<br>600 x 1200 lg., 2 Deck, Type 110<br>TY-Rocket @ 22° | One | Mechanical | [illegible] | [illegible] | W.S. Tyler Co. Ltd. | | | C1835-4-1515 | | | [illegible] |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 2 OF 3

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4007 | Screen Discharge Chute | One<br>Platework<br>0.2t | $ 700.00 | | C1835-2/SK304<br>C1835-4-1515 | 2<br>[illegible] | NEW |
| 4008 | By-Pass Chute | One<br>Platework<br>0.4t | $. 400.00 | | C1835-2/SK305<br>C1835-4-1515 | 2<br>[illegible] | NEW |
| 4009 | Screen U/Size Chute | One<br>Platework | | [illegible] | C1835 2/SK306<br>C1835 4-1515 | 2<br>[illegible] | NEW |
| 4010 | Raw Coal Crusher | One<br>Mechanical | | Gruendler | C1835-4-1515 | | EXISTING |
| 4011 | Redler Conv. Feed Chute and By-Pass c/w Flop Gate | One<br>Platework<br>0.3t | $1050.00 | | C1835-2/SK307<br>C1835-4-1515 | 2<br>[illegible] | NEW |
| 4012 | Redler "L" Type Conveyor 3002/200 'U' | One<br>Mechanical<br>2.2t | $.16 733.00 | Stephens-Adamson | C1835 4-1515 | | NEW |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 3 OF 3

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4013 | Feed Chute to 10 Tonne Bin | One<br>Platework<br>0.1 t | $ 350.00 | | C1835-2/SK308<br>C1835-4-1515 | 2<br>[illegible] 83 | NEW |
| 4014 | Raw Coal Skip | C.2 t | $ 1150.00 | PLATEAU<br>MAN. S. | | | |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 1 OF 22

**SIMON-CARVES**

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4051 | Raw Coal Feed Bin<br>10 Tonne Capacity | One<br>Platework<br>4.2 t | $18000.00 | | C1835-4/2501<br>C1835-4-1502 | △1<br>MARCH 1982<br>FOR SELECTION | NEW (SEE DETAILED DWG. C1835 4-2501) |
| 4052 | Raw Coal Tank<br>1.2 $m^3$ | One<br>Platework<br>0.6 t | $2100.00 | | C1835-2/SK321<br>C1835-4-1500 | △2<br>MARCH 83 | NEW |
| 4053 | Mixing Tank<br>1.8 $m^3$ | One<br>Platework<br>0.72 t | | | C1835-4-1500 | | EXISTING |
| 4054 | Heavy Medium Tank<br>1.0 $m^3$ | One<br>Platework<br>0.5 t | | Datap Systems<br>C1779-4-2502 | C1835-4-1500 | △<br>FEB 1983 | SUPPLIED BY DATAP |
| 4055 | Dilute Medium Tank<br>2.0 $m^3$ | One<br>Platework<br>0.8 t | | | C1835-4-1500 | | EXISTING<br>[illegible] |
| 4056 | Fines Tank<br>1.2 $m^3$ | One<br>Platework<br>0.6 t | | | C1835-4-1500 | | EXISTING |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 2 OF 22

**SIMON-CARVES**

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4057 | Slimes Tank<br>1.3 $m^3$ | One<br>Platework |  |  | C1835-2/SK323 | 2 | EXISTING |
|  |  | 0.6 t |  |  | C1835-4-1500 | [illegible] | [illegible] |
| 4058 | Pump Box<br>Clean Coal Centrate<br>0.3 $m^3$ | One<br>Platework |  |  |  |  | EXISTING |
|  |  | [illegible] |  |  | C1835-4-1500 |  |  |
| 4059 | Pump Box<br>Fines Reject Centrate<br>0.1 $m^3$ | One<br>Platework |  |  | C1835-2/SK342 | 1 | [illegible] |
|  |  | 0.[illegible] | $ 250.00 |  | C1835-4-1500 | [illegible]<br>FOR APP. |  |
| 4060 | Pump Box<br>Fines W.O. Cyclone Feed<br>1.3 $m^3$ | One<br>Platework |  |  | C1835-2/SK324 | 2 | [illegible] |
|  |  | 0.25 t | $ 1580.00 |  | C1835-4-1501 | [illegible] |  |
| 4061 |  |  |  |  |  |  |  |
| 4062 | Clarified Water Tank<br>3.3 $m^3$ | One<br>Platework |  |  | C1835-2/SK325 |  | [illegible] |
|  |  |  |  |  | C1835-4-1500 |  |  |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 3 OF 22

**SIMON-CARVES**

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE | | SUPPLIER | SCAN DWG. OR SKETCH NO. | REVISION | REMARKS |
|---|---|---|---|---|---|---|---|
| | | WEIGHT | EQUIPMENT COST | SUPPLIERS DWG. NO. | LAYOUT DWG. NO. | DATE | |
| 4063 | Make-up Water Tank<br>1.0 $m^3$ | One<br>Platework | | | C1835-2/SK326 | 2 | NEW |
| | | 0.13 t | $1500.00 | | C1835-4-1502 | [illegible] 1983 | |
| 4064 | Thickener Feed Tank<br>1.3 $m^3$ | One<br>Platework | | Envirotech Ltd. | | | EXISTING |
| | | 0.1 t | | 15698-T | C1835-4-1501 | | |
| 4065 | Clean Coal Tank<br>0.4 $m^3$ | One<br>Platework | | | C1835-2/SK327 | 2 | NEW |
| | | 0.2 t | $700.00 | | C1835-4-1501 | [illegible] 1983 | |

EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT NO.:** C1835 **DATE:** December 10, 1982 **PG.** 4 **OF** 22

**SIMON-CARVES**

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| 4071 | Heavy medium Distributor | One<br>Platework<br><br>0.1t | | Datap Systems<br>C1779-4-2501 | <br>C1835-4-1501 | Δ1<br>FEB. 1983 | SUPPLIED BY DATAP |
| 4072 | Splitter Box<br>Heavy or Dilute Medium | One<br>Platework<br><br>0.15t | | Datap Systems<br>C1779-4-2500 | <br>C1835-4-1501 | Δ1<br>FEB. 1983 | SUPPLIED BY DATAP |
| 4073 | Splitter Box<br>Mag. Sep. Tailings | One<br>Platework<br><br>0.15t | | Datap Systems<br>C1779-4-2500 | <br>C1835-4-1501 | Δ1<br>FEB. 1983 | [illegible] |
| 4074 | Splitter Box<br>W.O. Cyclone O/Flow | One<br>Platework<br><br>0.2t | [illegible] | | C1835-2/SK331<br>C1835-4-1502 | Δ1<br>[illegible] | NEW |

EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 5 OF 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4075 | 3-way Distributor | One<br>Platework<br><br>0.12t | $ 420.00 | | C1835-2/SK332<br>C1835-4-1502 | 2<br>March 1983 | NEW |
| 4076 | Splitter Box<br>Linatex Separator O/Flow | One<br>Platework<br><br>0.15t | $ 550.00 | | C1835-2/SK333<br>C1835-4-1501 | [illegible]<br>March 1983<br>for appro'l | NEW |
| | | | | | | | |
| | | | | | | | |
| 4079 | Launder<br>magnetite Feed<br>150 High, 200 Wide, 1300 Long | One<br>Platework<br><br>0.04t | $ 150.00 | | C1835-4-1500 | | NEW |
| 4080 | Pulp Divider | One<br>Piping | | | C1835-4-1502 | | EXISTNG |
| | | | | | | | |

EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 6 OF 22

SIMON-CARVES

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4081 | 200 Dia. W.O. Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |
| 4082 | 200 Dia. W.O. Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |
| 4083 | 200 Dia. W.O. Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |
| 4084 | 200 Dia. Classifying Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |
| 4085 | 200 Dia. Classifying Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |
| 4086 | 200 Dia. W.O. Cyclone | One<br>Piping | | | C1835-4-1502 | | EXISTING |

EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT Nº.: C1835 DATE: December 10, 1982 PG. 7 OF 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY | DISCIPLINE | WEIGHT | EQUIPMENT COST | SUPPLIER | SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO. | LAYOUT DWG. NO. | REVISION | DATE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4087 | 200 Dia. W.O. Cyclone | One | Piping | | | | | | C1835-4-1502 | | | EXISTING |
| 4088 | Linatex Separator<br>200 Dia.<br>SE-209A | One | Piping | | | Law Jack Equip. Ltd. | C-2952 | | C1835-4-1502 | | | EXISTING |
| 4089 | DMS Cyclone<br>200 Dia. | One | Piping | | | DORR-OLIVER | | | C1835-4-1502 | | | NEW |
| | | | | | | | | | | | | |
| 4091 | Sieve Bend<br>H.M. Recovery - Clean Coal<br>600 Wide, 45°, 750 Radius | One | Mechanical | 0.5 t | | | | | C1835-4-1502 | | | EXISTING |
| 4092 | Sieve Bend<br>H.M. Recovery - Discard<br>300 Wide, 45°, 750 Radius | One | Mechanical | [illegible] | [illegible] | DORR-OLIVER | | | C1835-4-1502 | | | NEW |
| | | | | | | | | | | | | |

EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 8 OF 22

**SIMON-CARVES**

| :TEM NO. | DESCRIPTION | QUANTITY | DISCIPLINE | WEIGHT | EQUIPMENT COST | SUPPLIER | SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO. | LAYOUT DWG. NO. | REVISION | DATE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4093 | Sieve Bend<br>Desliming<br>600 Wide, $45^{0}$, 750 Radius | One | Mechanical | 0.5t | | | | | C1835-4-1501 | | | EXISTING |
| 4094 | Sieve Bend<br>Middlings<br>600 Wide, $45^{0}$, 750 Radius | One | Mechanical | 0.45t | $ 2850.00 | Dorr [illegible] | | | C1835-4-1501 | | | NEW |
| | | | | | | | | | | | | |
| 4096 | Sieve Bend<br>Coarse Clean Coal<br>600 Wide, $45^{0}$, 750 Radius | One | Mechanical | 0.5t | | Dorr-Oliver Long Ltd. | | | C1835-4-1502 | | | EXISTING |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT Nº.: C1835 DATE: December 10, 1982 PG. 9 OF 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| 4101 | Screen<br>Desliming<br>600 x 1200 lg., 1 Deck, # Type 110<br>TY-Rocket @ 5⁰ | One<br>Mechanical<br>0.5t | [illegible] | W.S. Tyler Co. Ltd. | C1835-4-1501 | | NEW |
| 4102 | Screen<br>H.M. Recovery Clean Coal<br>600 x 1200 lg., 1 Deck A/S, # Type 110<br>TY-Rocket @ 5⁰ | One<br>Mechanical<br>0.5t | | W.S. Tyler Co. Ltd.<br>D-40599 | C1835-4-1502 | | [illegible] |
| 4103 | Screen<br>H.M. Recovery Discard<br>600 x 1200 lg., 1 Deck, # Type 110<br>TY-Rocket @ 5⁰ | One<br>Mechanical<br>0.5t | [illegible] | W.S. Tyler Co. Ltd. | | | NEW |
| 4104 | Screen<br>Fines Clean Coal<br>J24-36 MS-1<br>Derrick @ 30⁰ | One<br>Mechanical | | Derrick Corp.<br>3431-05-001 Rev. 2 | C1835-4-1502 | | [illegible] |

EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 10 OF 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4105 | Screen<br>Coarse Reject<br>600 x 1200 lg., 1 Deck, # Type 110-R<br>TY-Speed @ 20° | One<br>Mechanical<br><br>0.5 t | | W.S. Tyler Co. Ltd. | C1835-4-1501 | | EXISTING MAY REQUIRE NEW SCREEN MESH. |
| 4106 | Screen<br>Dewatering<br>Sweco Model US 48S88<br>1200 Dia. | One<br>Mechanical<br><br>0.35 t | | Sweco Canada Ltd. | C1835-4-1502 | | EXISTING |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 11 OF 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY | DISCIPLINE | WEIGHT | EQUIPMENT COST | SUPPLIER | SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO. | LAYOUT DWG. NO. | REVISION | DATE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4111 | Batac Jig<br>Feed Capacity 4 T/H<br>Laboratory Type | One | Mechanical | 0.8 t | | Humbolt Wedag | 672-10-077BA | | C1835-4-1502 | | | EXISTING |
| 4112 | Magnetic Separator | One | Mechanical | | | | | | C1835-4-1502 | | | EXISTING |
| 4113 | Flotation Cells<br>Denver "D-R"<br>6 Cell Bank<br>Capacity 10 cu. ft. (each) | One | Mechanical | 2.4 t | | Joy Manu. Co. Ltd. | MO-71219-A Rev. 2 | | C1835-4-1501 | | | EXISTING |
| 4114 | Hi-Capacity Thickener<br>2400 Dia. x 2400 Side Water Depth | One | Mechanical | | | Envirotech Ltd. | 15698-T | | C1835-4-1501 | | | EXISTING |
| 4115 | Centrifuge<br>Clean Coal<br>Bird-Escher Wyss Pusher<br>Model 500 | One | Mechanical | 4.5 t | | Bird Machine Co. | XEW2-907 0009-5 | | C1835-4-1500 | | | EXISTING |
| 4116 | Centrifuge<br>Fines Reject<br>Bird - Solid Bowl | One | Mechanical | | | Bird Machine Co. | | | C1835-4-1500 | | | EXISTING |

EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 12 **OF** 22

SIMON-CARVES

| ITEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4117 | Flotation Cells<br>Wemco Model 36<br>5 Cell Bank<br>Capacity 10 cu. ft. (each) | One<br>Mechanical | | | | | CANMET<br>(FUTURE) |
| 4118 | Filter (optional) | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 4121 | Metering Feeder<br>Raw Coal<br>Model WF 300 | One<br>Mechanical | | K-Tron Corp.<br>C-0125-00000 | C1835-4-1501 | | EXISTING |
| 4122 | Feeder c/w Hopper<br>Magnetite<br>Model FBV-413 | One<br>Mechanical<br>[illegible] | | Sepor Lab. Supply | C1835-4-1501 | | CANMET<br>(EXISTING) |

EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 13 **OF** 22

| ITEM NO. | SIMON-CARVES<br>*DESCRIPTION* | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
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EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 14 OF 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| 4131 | Pump<br>Thickener U/Flow<br>Model Moyno L6 | One<br>Mechanical | | | C1835-4-1500 | | EXISTING. |
| 4132 | Pump<br>Raw Coal Tank<br>Allis-Chalmers 3 x 3 x 10 SRL | One<br>Mechanical | $ 2374.00<br>INCL. MOTOR | ALLIS-CHALMERS | C1835-4-1500 | | NEW |
| 4133 | Pump<br>Mixing Tank<br>Allis-Chalmers 5x 4 SRL-C | One<br>Mechanical | | | C1835-4-1500 | | EXISTING |
| 4134 | Pump<br>H.M. Feed<br>Allis-Chalmers 3 x 3 SRL | One<br>Mechanical | | | C1835-4-1500 | | EXISTING |

EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 15 **OF** 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4135 | Pump<br>Dilute Medium<br>Worthington 3 x 3 M-091 | One<br>Mechanical | | | C1835-<br>4-1500 | | EXISTING.<br>(NEW BASE FRAME REQ'D) |
| 4136 | Pump<br>Fines Tank<br>Denver 3 x 3 SRL - Sand Pump | One<br>Mechanical | | | C1835-<br>4-1500 | | EXISTING<br>(BASE FRAME REQ'D) |
| 4137 | Pump<br>Slimes Tank<br>Worthington 5 x 4 M | One<br>Mechanical | | | C1835-<br>4-1500 | | EXISTING |
| 4138 | Pump<br>C/Coal Centrate<br>Worthington 2 1/2 M - 091 | One<br>Mechanical | | | C1835-<br>4-1500 | | EXISTING |
| 4139 | Pump<br>Fines Reject Centrate<br>Monarch 1 1/2" x 1" | One<br>Mechanical | | | C1835-<br>4-1500 | | EXISTING |
| 4140 | Pump<br>Fines W.O.C. Feed<br>Allis-Chalmers 3 x 3 x 10 SRL | One<br>Mechanical | $ 2371.00<br>incl. Motor | ALLIS CHALMERS | C1835-<br>4-1501 | | NEW |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 16 OF 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4141 | Sala Pump<br>Flotation Cells Feed<br>Model SPV-260-3" | One<br>Mechanical<br>0.5 t | $ 4980.00 | ALLIS-CHALMERS | C1835-4-1500 |  | NEW |
| 4142 | Pump<br>Clarified Water<br>Worthington 4 x 4 | One<br>Mechanical |  |  | C1835-4-1500 |  | CANMET STOCK (CHECK SIZE) |
| 4143 | Pump<br>Batac Jig Water Feed<br>Worthington 2 x 2 | One<br>Mechanical |  |  | C1835-4-1500 |  | EXISTING |
| 4144 | Flocculant Make-up |  |  |  | C1835-4-1500 |  | EXISTING |
|  |  |  |  |  |  |  |  |
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EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 17 **OF** 22

| ITEM NO. | **SIMON-CARVES** *DESCRIPTION* | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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| | | | | | | | |
| 4151 | U/Pan<br>Desliming Screen | One<br>Platework | | W.S. Tyler Co. Ltd. | C1835-4-1501 | | [illegible] |
| 4152 | U/Pan<br>H.M. Recovery C/Coal Screen | One<br>Platework | | W.S. Tyler Co. Ltd. | C1835-4-1502 | | [illegible] |
| | | | | | | | |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT Nº.: C1835 DATE: December 10, 1982 PG. 18 OF 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4153 | U/Pan<br>H.M. Recovery Discard Screen | One<br>Platework | | | C1835-4-1502 | | NEW<br>SEE 4105 |
| 4154 | U/Pan<br>Derrick Screen | One<br>Platework<br><br>0.1 t | | | C1835-4-1502 | | EXISTING |
| 4155 | U/Pan<br>Coarse Reject Screen | One<br>Platework | | | C1835-4-1501 | | EXISTING<br>TY-SPEED<br>U/PAN |
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EQUIPMENT LIST

:LIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 19 OF 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY / DISCIPLINE / WEIGHT | EQUIPMENT COST | SUPPLIER / SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO. / LAYOUT DWG. NO. | REVISION / DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| 4161 | Middlings Product Chute c/w Flopper Gate | One<br>Platework | | | C1835-2/SK334 Shts 1 & 2 | △2<br>MARCH 1983 | NEW |
| 4162 | Desliming Screen Chute c/w Flopper Gate | One<br>Platework | | | C1835-2/SK335 Shts 1 & 2 | △2<br>MARCH 1983 | NEW |
| 4163 | Coarse Rejects Chute c/w Flopper Gate | One<br>Platework | | | C1835-2/SK336 Shts 1 & 2 | △2<br>MARCH 1983<br>FOR APP'L | NEW |
| 4164 | Pneumatic Cylinder "Martonair" M/9125 | One<br>Mechanical | | Martonair Ltd. | | △!<br>FEB. 1983 | SUPPLIED BY DATAP |
| | | | | | | | |

EQUIPMENT LIST

CLIENT: CANMET, Coal Research Laboratories PROJECT No.: C1835 DATE: December 10, 1982 PG. 20 OF 22

| ITEM NO. | SIMON-CARVES DESCRIPTION | QUANTITY<br>DISCIPLINE<br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4165 | Pneumatic Cylinder "Martonair" M/9125 | One<br>Mechanical | | Martonair Ltd. | | ⚠<br>FEB. 1983 | SUPPLIED BY DATAR |
| 4166 | De-Magnetizing Coil | One<br>Mechanical | $ 1193.00 | ERIEZ LTD. | | | NEW |
| | | | | | | | |
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EQUIPMENT LIST

**CLIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 21 **OF** 22

| ITEM NO. | SIMON-CARVES<br>DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | <br><br>EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4171 | Middlings Product Chute | One<br>Platework<br><br>0.12t | <br><br><br>$420.00 | | C1835-2/SK337 | 2<br>March 1983 | NEW |
| 4172 | Desliming Screen Chute | One<br>Platework<br><br>0.16t | <br><br><br>$560.00 | | C1835-2/SK338 | 2<br>March 1983 | NEW |
| 4173 | Coarse Rejects Chute | One<br>Platework<br><br>0.2t | <br><br><br>$700.00 | | C1835-2/SK339 | 2<br>March 1983 | NEW |
| 4174 | H.M. Clean Coal Chute | One<br>Platework<br><br>0.12t | <br><br><br>$420.00 | | C1835-2/SK340 | 2<br>March 1983 | NEW |
| 4175 | H.M. Discard Chute | One<br>Platework<br><br>0.1t | <br><br><br>$350.00 | | C1835-2/SK341 | 2<br>March 1983 | NEW |
| 4176 | Fines Clean Coal Chute (Derrick Screen) | One<br>Platework<br><br>0.05t | | | | | [illegible] |

EQUIPMENT LIST

**LIENT:** CANMET, Coal Research Laboratories **PROJECT No.:** C1835 **DATE:** December 10, 1982 **PG.** 22 **OF** 22

**SIMON-CARVES**

| TEM NO. | DESCRIPTION | QUANTITY<br>DISCIPLINE<br><br>WEIGHT | EQUIPMENT COST | SUPPLIER<br>SUPPLIERS DWG. NO. | SCAN DWG. OR SKETCH NO.<br>LAYOUT DWG. NO. | REVISION<br>DATE | REMARKS |
|---|---|---|---|---|---|---|---|
| 4177 | Clean Coal Centrifuge Discharge Chute | One<br>Platework<br><br>0.05 t | $ 175.00 | | C1835-2/SK343 | △1<br>MARCH 1983 FOR APP'L | NEW |
| 4178 | Fines Reject Centrifuge Discharge Chute | One<br>Platework<br><br>0.05 t | $ 175.00 | | C1835-2/SK344 | △1<br>MARCH 1983 FOR APP'L | NEW |
| 4179 | Solids Sampling Device | One<br>Platework<br><br>0.05 t | $ 175.00 | | C1835-2/SK345 | △1<br>MARCH 1983 FOR APP'L | NEW |

# APPENDIX THREE

## DRAWING REGISTER

# APPENDIX THREE

## DRAWING REGISTER

### Introduction

This register has been compiled as the work has progressed and contains all layout drawings, including deleted alternatives; arrangement drawings; detail drawings; and sketches produced for the total project.

Each addition comprises SCAN Drg. No.; drawing status (i.e., cancelled or current); and the drawing description which would be used in any reference.

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 0 | FLOWSHEET |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| ~~C1835-4-0500~~<br>CANCELLED | ~~FLOWSHEET~~ | 80<br>60<br>40<br>20 | |
| ~~C1835-4-0501~~<br>CANCELLED | ~~FLOWSHEET - OPTION 1~~ | 80<br>60<br>40<br>20 | |
| ~~C1835-4-0502~~<br>CANCELLED | ~~FLOWSHEET - OPTION 2 AND 5~~ | 80<br>60<br>40<br>20 | |
| ~~C1835-4-0503~~<br>CANCELLED | ~~FLOWSHEET - OPTION 3 AND 4~~ | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| ~~C1835-4-0505~~<br>CANCELLED | ~~FLOWSHEET - OPTION 2~~ | 80<br>60<br>40<br>20 | |
| C1835-4-0506<br>CANCELLED | FLOWSHEET - OPTION 3 | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| C1835-4-0508 | FLOWSHEET (MAX. FLOWS) | 80<br>60<br>40<br>20 | |
| C1835-4-0509 | RAW COAL FEED<br>FLOWSHEET | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** (S·C)

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 0 | FLOWSHEET |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 2

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-4-0510 | FLOWSHEET - SAMPLE POINTS | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| C1835-4-0514 | FLOWSHEET - PLANT BALANCE<br>COARSE W.O. CYCLONES AND<br>FINE W.O. CYCLONES | 80<br>60<br>40<br>20 | |
| C1835-4-0515 | FLOWSHEET - PLANT BALANCE<br>COARSE W.O. CYCLONES AND<br>FROTH FLOTATION CELLS | 80<br>60<br>40<br>20 | |
| C1835-4-0516 | FLOWSHEET - PLANT BALANCE<br>BATAC JIG AND<br>FINE W.O. CYCLONES | 80<br>60<br>40<br>20 | |
| C1835-4-0517 | FLOWSHEET - PLANT BALANCE<br>BATAC JIG AND<br>FROTH FLOTATION CELLS | 80<br>60<br>40<br>20 | |
| C1835-4-0518 | FLOWSHEET - PLANT BALANCE<br>H.M. CYCLONE AND<br>FINE W.O. CYCLONES | 80<br>60<br>40<br>20 | |
| C1835-4-0519 | FLOWSHEET - PLANT BALANCE<br>H.M. CYCLONE AND<br>FROTH FLOTATION CELLS | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 1 | LAYOUTS |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS, D |
|---|---|---|---|
| C1835-4-1500 | GENERAL ARRANGEMENT<br>PLAN ON GROUND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-1501 | GENERAL ARRANGEMENT<br>PLAN ON FIRST FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-1502 | GENERAL ARRANGEMENT<br>PLAN ON SECOND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-1503<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION A-A | 80<br>60<br>40<br>20 | |
| C1835-4-1504<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION B-B | 80<br>60<br>40<br>20 | |
| C1835-4-1505<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION C-C | 80<br>60<br>40<br>20 | |
| C1835-4-1506<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION D-D | 80<br>60<br>40<br>20 | |
| C1835-4-1507<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION E-E | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** (S·C)

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLAN |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 1 | LAYOUTS |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 2

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| | | 80<br>60<br>40<br>20 | |
| C1835-4-1511<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION G-G | 80<br>60<br>40<br>20 | |
| C1835-4-1512<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTIONS H-H, J-J & K-K | 80<br>60<br>40<br>20 | |
| C1835-4-1513<br>CANCELLED | GENERAL ARRANGEMENT<br>PLANS | 80<br>60<br>40<br>20 | |
| C1835-4-1514<br>CANCELLED | GENERAL ARRANGEMENT<br>SECTION X-X<br>ALTERNATIVE 1 | 80<br>60<br>40<br>20 | |
| C1835-4-1515 | GENERAL ARRANGEMENT<br>PLANS | 80<br>60<br>40<br>20 | |
| C1835-4-1516 | GENERAL ARRANGEMENT<br>SECTIONAL ELEVATION | 80<br>60<br>40<br>20 | |
| C1835-4-1517 | GENERAL ARRANGEMENT<br>SECTIONS H-H, J-J & K-K | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S·C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 1 | LAYOUTS |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 3

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-4-1520 | GENERAL ARRANGEMENT<br>SECTION A-A | 80<br>60<br>40<br>20 | |
| C1835-4-1521 | GENERAL ARRANGEMENT<br>SECTION B-B | 80<br>60<br>40<br>20 | |
| C1835-4-1522 | GENERAL ARRANGEMENT<br>SECTION C-C | 80<br>60<br>40<br>20 | |
| C1835-4-1523 | GENERAL ARRANGEMENT<br>SECTION D-D | 80<br>60<br>40<br>20 | |
| C1835-4-1524 | GENERAL ARRANGEMENT<br>SECTION E-E | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S·C

CLIENT: CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-201<br>CANCELLED | EXISTING EQUIPMENT<br>TANKS | 80<br>60<br>40<br>20 | |
| C1835-2/SK-202<br>CANCELLED | EXISTING EQUIPMENT<br>CENTRIFUGE, SCREEN,<br>MAG. SEPARATOR, SUMP | 80<br>60<br>40<br>20 | |
| C1835-2/SK-203<br>CANCELLED | EXISTING EQUIPMENT<br>SCREEN, FLOT. CELLS<br>SIEVE BEND | 80<br>60<br>40<br>20 | |
| C1835-2/SK-204<br>CANCELLED | EXISTING EQUIPMENT<br>CYCLONES, BUCKET<br>ELEVATOR | 80<br>60<br>40<br>20 | |
| C1835-2/SK-205<br>CANCELLED | RAW COAL FEED<br>BELT CONV'R AND BUCKET<br>ELEVATOR FEED<br>ALTERNATE 1 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-206<br>CANCELLED | RAW COAL FEED<br>BUCKET ELEVATOR FEED<br>ALTERNATE 2 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-207<br>CANCELLED | RAW COAL FEED<br>BELT CONV'R AND BUCKET<br>ELEVATOR FEED<br>ALTERNATE 3 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-208<br>CANCELLED | RAW COAL FEED<br>BELT CONV'R FEED<br>HOPPER AND GRIZZLEY | 80<br>60<br>40<br>20 | |
| C1835-2/SK-209<br>CANCELLED | RAW COAL FEED<br>REDLER CONV'R. FEED<br>HOPPER AND GRIZZLEY | 80<br>60<br>40<br>20 | |
| C1835-2/SK-210<br>CANCELLED | RAW COAL FEED<br>REDLER CONV'R FEED,<br>SCRAPER AND BUCKET ELEVATOR | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S-C

CLIENT: CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 2

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-211<br>CANCELLED | FLOTATION CELLS<br>FROTH O/FLOW<br>LAUNDER | 80<br>60<br>40<br>20 | |
| C1835-2/SK-212<br>CANCELLED | ARRANGEMENT<br>FINES W.O. CYCLONES | 80<br>60<br>40<br>20 | |
| C1835-2/SK-213<br>CANCELLED | ARRANGEMENT<br>COARSE W.O. CYCLONES | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S·C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 3

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-301 | FEED HOPPER C/W GRIZZLEY<br>#4001 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-302 | DISCHARGE CHUTE #4003 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-303<br>SHEETS 1 & 2 | SCREEN FEED CHUTE<br>C/W FLOP GATE #4005 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-304 | SCREEN DISCHARGE CHUTE #4007 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-305 | BY-PASS CHUTE #4008 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-306 | SCREEN U/SIZE CHUTE #4009 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-307<br>SHEETS 1 & 2 | REDLER CONV. FEED CHUTE<br>AND BY-PASS C/W FLOP GATE<br>#4011 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-308 | FEED CHUTE TO 10 TONNE BIN<br>#4013 | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S·C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 4

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-320<br>CANCELLED<br>See Dwg.<br>C1835-4-2501 | 10 TONNE RAW COAL<br>FEED BIN #4051 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-321 | RAW COAL TANK #4052 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-322<br>CANCELLED<br>(Datap) | HEAVY MEDIUM TANK #4054 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-323 | SLIMES TANK #4057 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-324 | PUMP BOX: W.O. CYCLONE<br>FEED #4060 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-325 | CLARIFIED WATER TANK #4062 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-326 | MAKE-UP WATER TANK #4064 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-327 | CLEAN COAL TANK #4065 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-328<br>CANCELLED<br>(Datap) | HEAVY MEDIUM DISTRIBUTOR #4071 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-329<br>CANCELLED<br>(Datap) | SPLITTER BOX HEAVY OR<br>DILUTE MEDIUM #4072 | 80<br>60<br>40<br>20 | |

**SIMON-CARVES**

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 5

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-330<br>CANCELLED<br>(Datap) | SPLITTER BOX MAG. SEP.<br>TAILINGS #4073 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-331 | SPLITTER BOX W.O. CYCLONE<br>O/FLOW #4074 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-332 | 3 WAY DISTRIBUTOR #4075 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-333 | SPLITTER BOX LINATEX SEP.<br>FLOW #4076 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-334<br>SHEETS 1 & 2 | MIDDLINGS PRODUCT CHUTE<br>C/W FLOPPER GATE, #4161 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-335<br>SHEETS 1 & 2 | DESLIMING SCREEN CHUTE<br>C/W FLOPPER GATE #4162 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-336<br>SHEETS 1 & 2 | COARSE REJECT. CHUTE C/W<br>FLOPPER GATE #4163 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-337 | MIDDLINGS PRODUCT CHUTE #4171 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-338 | DESLIMING SCREEN CHUTE #4172 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-339 | COARSE REJECTS CHUTE #4173 | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

## DRAWING REGISTER

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## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-2/SK-340 | H.M. CLEAN COAL SCREEN CHUTE #4174 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-341 | H.M. DISCARD SCREEN CHUTE #4175 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-342 | FINES REJECT CENTRATE PUMP BOX #4059 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-343 | CLEAN COAL CENTRIFUGE DISCHARGE CHUTE # 4177 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-344 | FINES REJECT CENTRIFUGE DISCHARGE CHUTE #4178 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-345 | SOLIDS SAMPLING DEVICE #4179 | 80<br>60<br>40<br>20 | |
| C1835-2/SK-346 | PROPOSED 45 GALLON DRUM TROLLEY | 80<br>60<br>40<br>20 | |
| C1835-2/SK-347 | PROPOSED LIQUIDS SAMPLING SYSTEM | 80<br>60<br>40<br>20 | |
| C1835-2/SK-348 | TYPICAL O/FLOW DETAILS | 80<br>60<br>40<br>20 | |
| C1835-2/SK-349 | PLATEWORK GENERAL NOTES | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** (S-C)

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 2 | PLATEWORK |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 7

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C1835-4-2501 | 10 TONNE RAW COAL FEED BIN ARRANGEMENT AND DETAILS | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835/5 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 3 | CIVIL |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % |
|---|---|---|
| C1835-4-3501 | CIVIL<br>GROUND FLOOR | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 4 | STRUCTURAL |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV.<br>DATE<br>ISS,D |
|---|---|---|---|
| C1835-4/SK-001<br>CANCELLED | STEELWORK<br>PLAN ON GROUND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4/SK-002 | STEELWORK - EXISTING FRAMING<br>PLAN ON FIRST FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4/SK-003 | STEELWORK - EXISTING FRAMING<br>PLAN ON SECOND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4/SK-004<br>CANCELLED | STEELWORK<br>SECTIONS A-A, B-B | 80<br>60<br>40<br>20 | |
| C1835-4/SK-005<br>CANCELLED | STEELWORK<br>SECTION C-C | 80<br>60<br>40<br>20 | |
| C1835-4/SK-006<br>CANCELLED | STEELWORK<br>SECTION D-D | 80<br>60<br>40<br>20 | |
| C1835-4/SK-007<br>CANCELLED | STEELWORK<br>SECTION E-E | 80<br>60<br>40<br>20 | |
| C1835-4/SK-008<br>CANCELLED | STEELWORK<br>SECTION F-F | 80<br>60<br>40<br>20 | |
| C1835-4/SK-009<br>CANCELLED | RAW COAL FEED<br>STEELWORK<br>PLANS | 80<br>60<br>40<br>20 | |
| C1835-4/SK-010<br>CANCELLED | RAW COAL FEED<br>STEELWORK<br>SECTION G-G | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 4 | STRUCTURAL |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 2

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | REV. DATE ISS,D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ~~C1835-4/SK-011~~<br>~~CANCELLED~~ | ~~RAW COAL FEED~~<br>STEELWORK<br>~~SECTIONS H-H, J-J, AND K-K~~ | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| C1835-4/SK-012<br>CANCELLED | STEELWORK<br>PROPOSED FLOOR LAYOUT -<br>LEVEL 1 | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| C1835-4/SK-013<br>CANCELLED | STEELWORK<br>PROPOSED FLOOR LAYOUT -<br>LEVEL 2 | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | |

**SIMON-CARVES** S-C

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 4 | STRUCTURAL |
| DISCIPLINE | | |

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

# DRAWING REGISTER

PAGE 3

## DWG. PROGRESS

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN

| DWG. Nº | DRAWING TITLE | % |
|---|---|---|
| C1835-4-4501 | STEELWORK<br>FLOOR PLANS | 80<br>60<br>40<br>20 |
| C1835-4-4502 | STEELWORK<br>ACCESS PLATFORMS AND EQUIPMENT<br>SUPPORTS | 80<br>60<br>40<br>20 |
| C1835-4-4503 | STEELWORK<br>FLOOR PLANS<br>(GRATING CUT-OUTS) | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |
| | | 80<br>60<br>40<br>20 |

# SIMON-CARVES

S·C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 5 | PIPING |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-4-5501 | PIPING ARRANGEMENT<br>PLAN ON GROUND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-5502 | PIPING ARRANGEMENT<br>PLAN ON FIRST FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-5503 | PIPING ARRANGEMENT<br>PLAN ON SECOND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-5504 | PIPING ARRANGEMENT<br>SECTION A-A | 80<br>60<br>40<br>20 | |
| C1835-4-5505 | PIPING ARRANGEMENT<br>SECTION B-B | 80<br>60<br>40<br>20 | |
| C1835-4-5506 | PIPING ARRANGEMENT<br>SECTION C-C | 80<br>60<br>40<br>20 | |
| C1835-4-5507 | PIPING ARRANGEMENT<br>SECTION D-D | 80<br>60<br>40<br>20 | |
| C1835-4-5508 | PIPING ARRANGEMENT<br>SECTION E-E | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S·C

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 6 | INSTRUMENTATION |
| DISCIPLINE | | |

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

# DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-4-6500 | LEGEND FOR P. & I. DIAGRAM | 80<br>60<br>40<br>20 | |
| C1835-4-6501 | P. & I. DIAGRAM | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES** S-C

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 7 | ELECTRICAL |
| DISCIPLINE | | |

# DRAWING REGISTER

PAGE 1

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | REV. DATE ISS,D |
|---|---|---|---|
| C1835-4-7501<br>SHTS 1,2,3 & 4 | SINGLE LINE DIAGRAM | 80<br>60<br>40<br>20 | |
| C1835-4-7502<br>SHTS 1 to 20 | CIRCUIT SCHEDULE SHEET | 80<br>60<br>40<br>20 | |
| C1835-4-7510 | RAW COAL FEED<br>POWER & CONTROL LAYOUT | 80<br>60<br>40<br>20 | |
| C1835-4-7511 | POWER & CONTROL LAYOUT<br>GROUND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-7512 | POWER & CONTROL LAYOUT<br>FIRST FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-7513 | POWER & CONTROL LAYOUT<br>SECOND FLOOR | 80<br>60<br>40<br>20 | |
| C1835-4-7514 | PROPOSED ARRG'T OF MCC | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |
| | | 80<br>60<br>40<br>20 | |

**SIMON-CARVES**

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 7 | ELECTRICAL |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 2

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % |
|---|---|---|
| C1835/E/SK-1 | LOGIC DIAGRAM<br>LEGEND AND NOTES | 80<br>60<br>40<br>20 |
| C1835/E/SK-2 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 1" | 80<br>60<br>40<br>20 |
| C1835/E/SK-3 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 2" | 80<br>60<br>40<br>20 |
| C1835/E/SK-4 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 3" | 80<br>60<br>40<br>20 |
| C1835/E/SK-5 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 4" | 80<br>60<br>40<br>20 |
| C1835/E/SK-6 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 5" | 80<br>60<br>40<br>20 |
| C1835/E/SK-7 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 6" | 80<br>60<br>40<br>20 |
| C1835/E/SK-8 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 1" | 80<br>60<br>40<br>20 |
| C1835/E/SK-9 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 2" | 80<br>60<br>40<br>20 |
| C1835/E/SK-10 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 3" | 80<br>60<br>40<br>20 |

**SIMON-CARVES** S-C

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 7 | ELECTRICAL |
| DISCIPLINE | | |

**CLIENT:** CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

# DRAWING REGISTER

PAGE 3

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % |
|---|---|---|
| C1835/E/SK-11 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 4" | 80<br>60<br>40<br>20 |
| C1835/E/SK-12 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 5" | 80<br>60<br>40<br>20 |
| C1835/E/SK-13 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 6" | 80<br>60<br>40<br>20 |
| C1835/E/SK-14 | LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 7" | 80<br>60<br>40<br>20 |
| C1835/E/SK-15 | FLOWSHEET-LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 1" | 80<br>60<br>40<br>20 |
| C1835/E/SK-16 | FLOWSHEET-LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 2" | 80<br>60<br>40<br>20 |
| C1835/E/SK-17 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 3" | 80<br>60<br>40<br>20 |
| C1835/E/SK-18 | FLOWSHEET-LOGIC DIAGRAM<br>PROCESS OPTION<br>PRIMARY 4" | 80<br>60<br>40<br>20 |
| C1835/E/SK-19 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 5" | 80<br>60<br>40<br>20 |
| C1835/E/SK-20 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"PRIMARY 6" | 80<br>60<br>40<br>20 |

**SIMON-CARVES** S·C

CLIENT: CANMET - COAL RESEARCH LABORATORIES
10 T.P.H. COAL PREPARATION
PILOT PLANT AT DEVON

| CODES | Nº | DESCRIPTION |
|---|---|---|
| JOB | C1835 | CANMET |
| AREA | 4 | COAL PREP. PILOT PLANT |
| SUB-AREA | | |
| SYSTEM | | |
| GROUP | 7 | ELECTRICAL |
| DISCIPLINE | | |

## DRAWING REGISTER

PAGE 4

## DWG. PROGRESS

| DWG. Nº | DRAWING TITLE | % | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C1835/E/SK-21 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 1" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-22 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 2" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-23 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 3" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-24 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 4" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-25 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 5" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-26 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 6" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-27 | FLOWSHEET LOGIC DIAGRAM<br>PROCESS OPTION<br>"SECONDARY 7" | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1835/E/SK-28 | LOGIC DIAGRAM<br>RAW COAL FEED | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 80<br>60<br>40<br>20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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